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Archaeological Investigations In The Clinton Lake Project Area Northeastern Kansas

National Register Evaluation of 27 Prehistoric Sites

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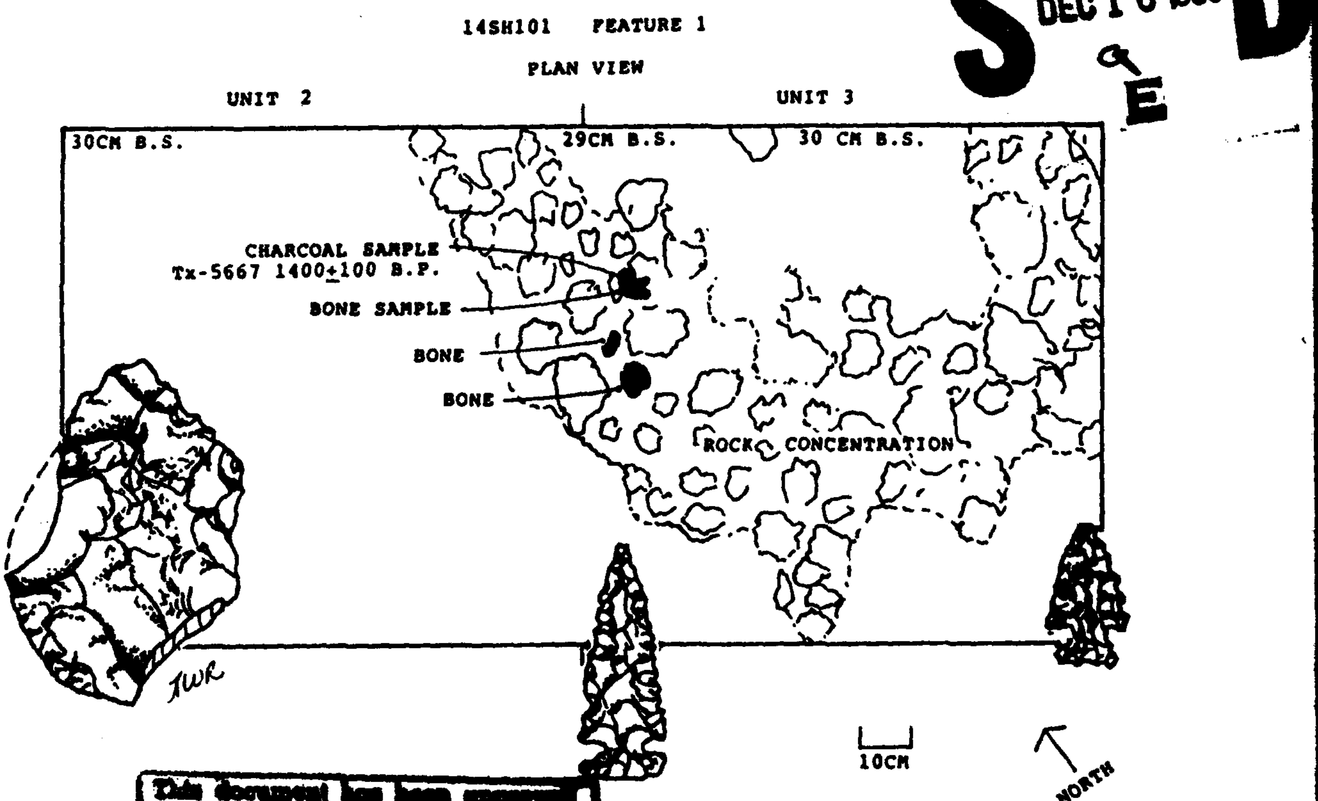

Prepared by:
Kaw Valley Engineering & Development, Inc.
Junction City, Kansas
Parkville, Missouri

Prepared for:
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ARCHAEOLOGICAL INVESTIGATIONS IN THE CLINTON LAKE PROJECT AREA, NORTHEASTERN KANSAS: NATIONAL REGISTER EVALUATION OF 27 PREHISTORIC SITES

Edited by

Brad Logan

Contributing Authors

Mary J. Adair
Steven Bozarth
Glen G. Fredlund
Brad Logan
Rolfe D. Mandel
William Ranney
Lauren W. Ritterbush

Principal Investigator

Brad Logan

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KAW VALLEY ENGINEERING & DEVELOPMENT, INC.
Junction City, Kansas
Parkville, Missouri

November, 1987

Funds for this investigation and report were provided by the U. S. Army Corps of Engineers. The Corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the Contractor who is responsible for collection of the data, analysis, conclusions and recommendations.

The study performed herein by the Contractor for the Corps of Engineers is called for in the National Historic Preservation Act of 1966 (PL 89-665) as amended by Public Laws 94-422 and 96-515 and is authorized for funding under Public Law 86-523 as amended by Public Law 93-291. Accomplishment of this work provides documentation evidencing compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" dated 13 May 1971, and Section 110 of the National Historic Preservation Act.

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Archaeological investigations at 27 prehistoric sites in the Clinton Lake Project Area, Douglas and Shawnee Counties, Kansas, to determine eligibility of the sites for National Register of Historic Places. Field and geomorphic investigations conclude that the sites span at least the last 2000-3000 yrs of human history in the Wakarusa River basin and indicate the presence of a crematorium—a feature unique in this region and of great research potential.

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Abstract

This report describes archaeological investigations at 27 prehistoric sites in the Clinton Lake Project Area, Douglas and Shawnee Counties, Kansas. The investigations were undertaken in order to determine the eligibility of the sites for the National Register of Historic Places. The project was funded by the Kansas City District, U. S. Army Corps of Engineers and conducted by Kaw Valley Engineering and Development, Inc. The project entailed site testing to determine the integrity and significance of cultural deposits. Sites investigated include: 14DO15, 14DO16, Hatcher (14DO19), Anderson (14DO32), Stull (14DO35), 14DO37, 14DO39, 14DO40, 14DO59, 14DO61, 14DO62, 14DO68, 14DO69, 14DO75, 14DO137, 14DO138, 14DO141, 14DO142, 14DO153, 14DO155, 14DO157, 14DO309, 14SH5, 14SH6, 14SH101 (Richland), 14SH102, and 14SH103.

Field investigations of sites included surface survey and piece plotting of diagnostic artifacts to determine horizontal site boundaries, topographic mapping, inspection of stream banks for buried cultural materials, manual excavation of test pits to determine depth and integrity of cultural deposits, and backhoe excavation of deep trenches to test for buried site components and to collect soil-geomorphic data. Laboratory analysis involved sorting and cataloging all recovered materials for curation and analysis of lithic, ceramic, historic, and biological assemblages, as well as submission of organic samples for radiocarbon analyses in order to date cultural and soil-geomorphic phenomena.

The results of the field and laboratory procedures have resulted in the following conclusions: the sites span at least the last 2000 to 3000 years of human history in the Wakarusa River basin, including the Late Archaic, Woodland, and Plains Village periods; soil-geomorphic investigations have outlined a model of valley landscape evolution which indicates some potential for buried Paleoindian, Early Archaic, and Middle Archaic sites; 25 of the sites do not possess sufficient cultural deposits and/or stratigraphic integrity to warrant consideration for the National Register of Historic Places; two sites contain cultural deposits of potential significance for understanding the Woodland and Plains Village periods in the study area.

Sites 14DO19 (Hatcher) and 14SH101 (Richland) contain significant or potentially significant deposits. Test excavations in Area A at the Hatcher site revealed a concentration of daub and associated artifacts that extends below the plow zone. This concentration is suggested to be the remains of a Clinton phase (Pomona variant, Plains Village period) habitation structure. It is suggested that Area A contains potentially valuable data for addressing research problems concerning the Pomona variant. Testing and backhoe excavations in Area C at the Hatcher site demonstrated the existence of a heretofore unknown, buried component. Since this component underlies a

previously excavated Pomona variant component, potentially signficant information about an earlier occupation at the site can be obtained.

Survey at 14SH101 revealed an extensive site tentatively assigned to the Deer Creek phase (Plains Woodland). Excavation revealed a feature interpreted as a crematorium. Two averaged and calibrated radiocarbon dates from the feature provide the first absolute date for the Plains Woodland period of occupation in the Wakarusa River basin (A.D. 639). The presence of the feature, unique in this region of the Central Plains, and a variety of other artifacts at the site indicate its great research potential.

Acknowledgements

This project could not have been completed without the efforts of a number of people, including many who worked under great pressure in both the field and laboratory. The field work benefited greatly from the dedicated assistance of Dr. Kenneth L. Brown, who served as Field Director at a most hectic time in his career. Bill Ranney served as Field Assistant. The following persons worked, under conditions that were generally hot, humid and otherwise uncomfortable, as excavators: Marie Brown, Steve Bozarth, Fred Scott, Lauren Ritterbush, Russ Rude, Marlin Hawley, Sharon Geil, Tim Gillen, Barb Michael, Jean Hall, and Jim Gramling.

Laboratory work could not have been accomplished without the help of Jim Gramling, Bridgette DeSmet, and Sherri Thurmond, who washed 27,090 items recovered during the project, and Bill Ranney, Steve Bozarth, Lauren Ritterbush, Paul Uttinger, and Elaine Sung, who sorted and cataloged them. Steve conducted the analysis of lithic tools and Lauren examined thousands of pieces of debitage. The results of their efforts are found in the latter's contribution to this report. Bill ably collated a variety of data in the site descriptions section of the report.

The interdisciplinary nature of the Clinton Lake Archaeological Project is reflected in this report by the contributions of the following persons: Mr. Rolfe Mandel, University of Kansas, examined test units, stream banks and backhoe trenches for soil-geomorphic data. Dr. Mary Adair, Archaeobotanical Consulting, examined the important flotation samples from Feature 1 at 14SH101 for macrofloral remains. Mr. Glen Fredlund, Palynology Laboratory, University of Kansas, conducted a palynological investigation of the 15,350 year old samples of sediment from a buried deposit at the same site. Mr. Steven Bozarth, Palynology Laboratory, University of Kansas, conducted an opal phytolith analysis of daub samples from the Hatcher site.

I am also indebted to Dr. David Frayer, Department of Anthropology, University of Kansas, for helping me identify the human remains from the Richland site. Dr. Alfred E. Johnson, Director of the Musuem of Anthropology at the University of Kansas, served as a consultant on the project. Dr. Johnson directed the first major excavations in the study area in 1966 and his visits to the Stull and Hatcher sites during the field work phase of the project aided considerably in their investigation. Moreover, he offered valuable advice during the laboratory analysis phase of the project. Most of the figures in this report are the result of the collaborative efforts of several people. The site topographic maps are products of the laser transit, an incredible innovation in surveying that is rarely available to the archaeologist today. These maps owe much to the talents of Ron Johnson, Jim Long, and Julie Olson, all of Kaw Valley Engineering and Development, Inc. Test unit

profiles, plan views, and photo-layouts are the work of Paul Uttinger, a most dedicated undergraduate at the University of Kansas. Doris Peterson contributed valuable time in entering tabulated data on the word-processor.

I received logistical help from the following people in the study area: Mr. Tim Carey, Project Manager, and Mr. David Rhoades, Ranger, Clinton Lake Project; Mr. Gary Reid, Area Manager, Kansas Fish and Game Commission; and Bob Wallace, Park Manager, Clinton State Park. I am also grateful to Mr. Leon Osbourn, Kaw Valley Engineering and Development for his great interest in and support of the Clinton Lake Archaeological Project.

Finally, I could not have completed this project without the unstinting help of my wife, Lauren W. Ritterbush. Setting aside her own disseration research, she participated at various times during all phases of the project including research design, field work, laboratory work, analysis, and report preparation.

Brad Logan
Principal Investigator

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Chapter 1

THE CLINTON LAKE ARCHAEOLOGICAL PROJECT: PURPOSE, RESEARCH GOALS, AND BACKGROUND

Brad Logan

Introduction

This is a report of archaeological investigations at 27 prehistoric sites in the Clinton Lake Project Area, northeastern Kansas. These sites were selected by the Kansas City District, U.S. Army Corps of Engineers for evaluation of their potential eligibility for the National Register of Historic Places. The Kansas City District entered into a contractual agreement with Kaw Valley Engineering and Development of Junction City, Kansas for the investigation and evaluation of these sites. The project scope-of-work called for documentation and test excavation of the sites. In May 1986, Kaw Valley Engineering and Development submitted the required research design for the project and fieldwork commenced in July of that year. Test excavations were completed on September 6, 1986. Geomorphic investigations, including backhoe trenching and topographic site mapping, were completed in January 1987. The project was designed in accordance with the standards established in 36 CFR 66 ("Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements").

Clinton Lake, a flood-control project created by Clinton Dam, is located on the Wakarusa River in Douglas and Shawnee counties, Kansas (Fig. 1.1). The dam, authorized by Congress in 1962, was constructed from 1972 until 1977. The lake reached its multipurpose pool level in 1980, at which point it inundated about eight miles of the Wakarusa River valley and portions of the valleys of its tributaries, Rock Creek and Deer Creek. Clinton Lake, at multipurpose pool level, has a surface area of about 7,000 acres. At maximum flood pool, a total of 12,800 acres would be covered by the lake, which would then extend a distance of about 13 miles along the main stream valley.

One hundred and eighteen sites occur within the Clinton Lake Project Area (Fig. 1.2) and, as described below, a number of these have been tested during previous archaeological investigations. The 27 sites selected for this project (Fig. 1.2) are listed in Table 1.1. This is followed by a discussion of the research goals of the project, a summary description of the previous archaeological investigations in the project area, and a description of the organization of the report.

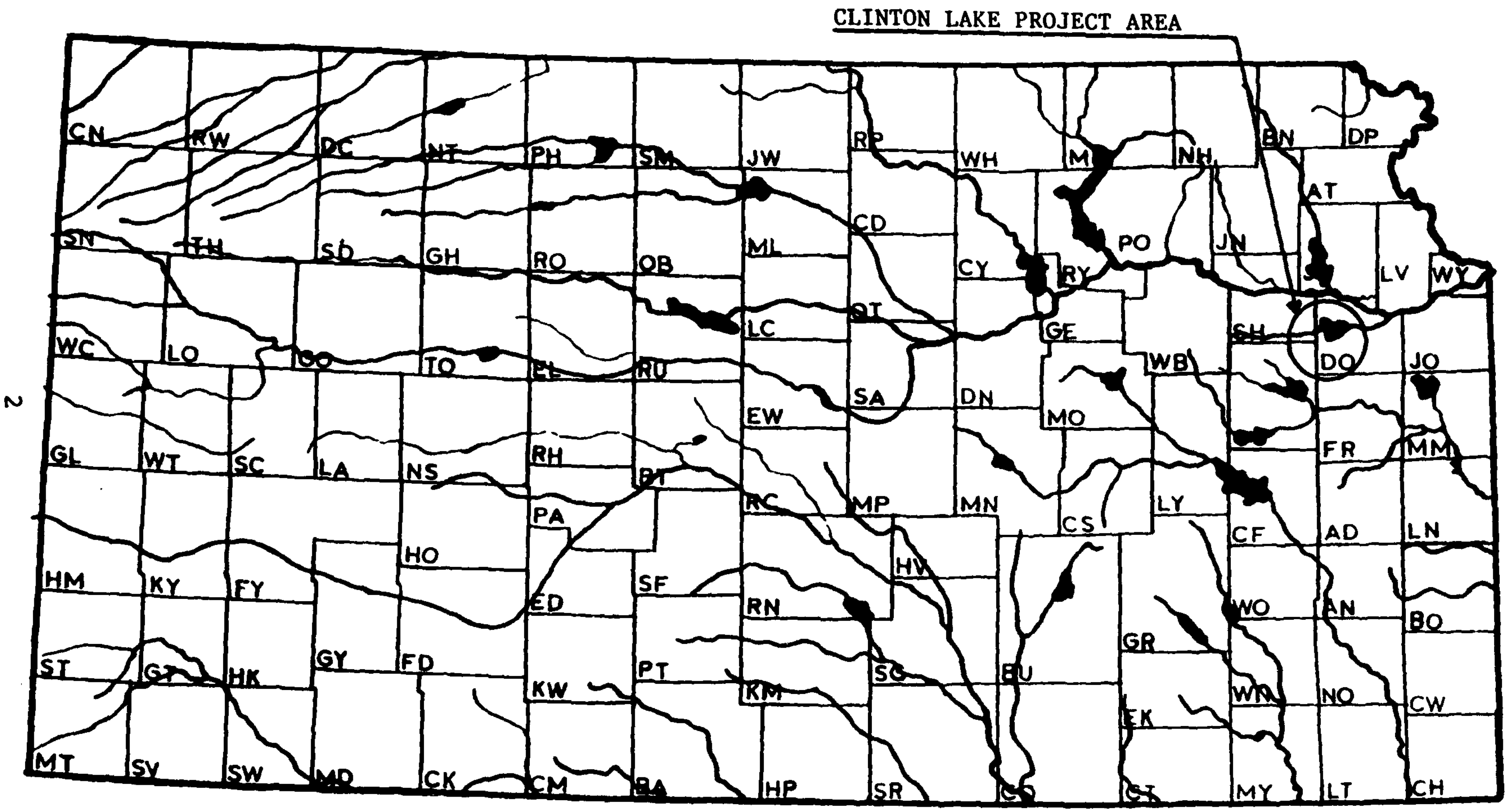


Figure 1.1 Map of Kansas showing the location of Clinton Lake Project Area in Douglas and Shawnee counties.

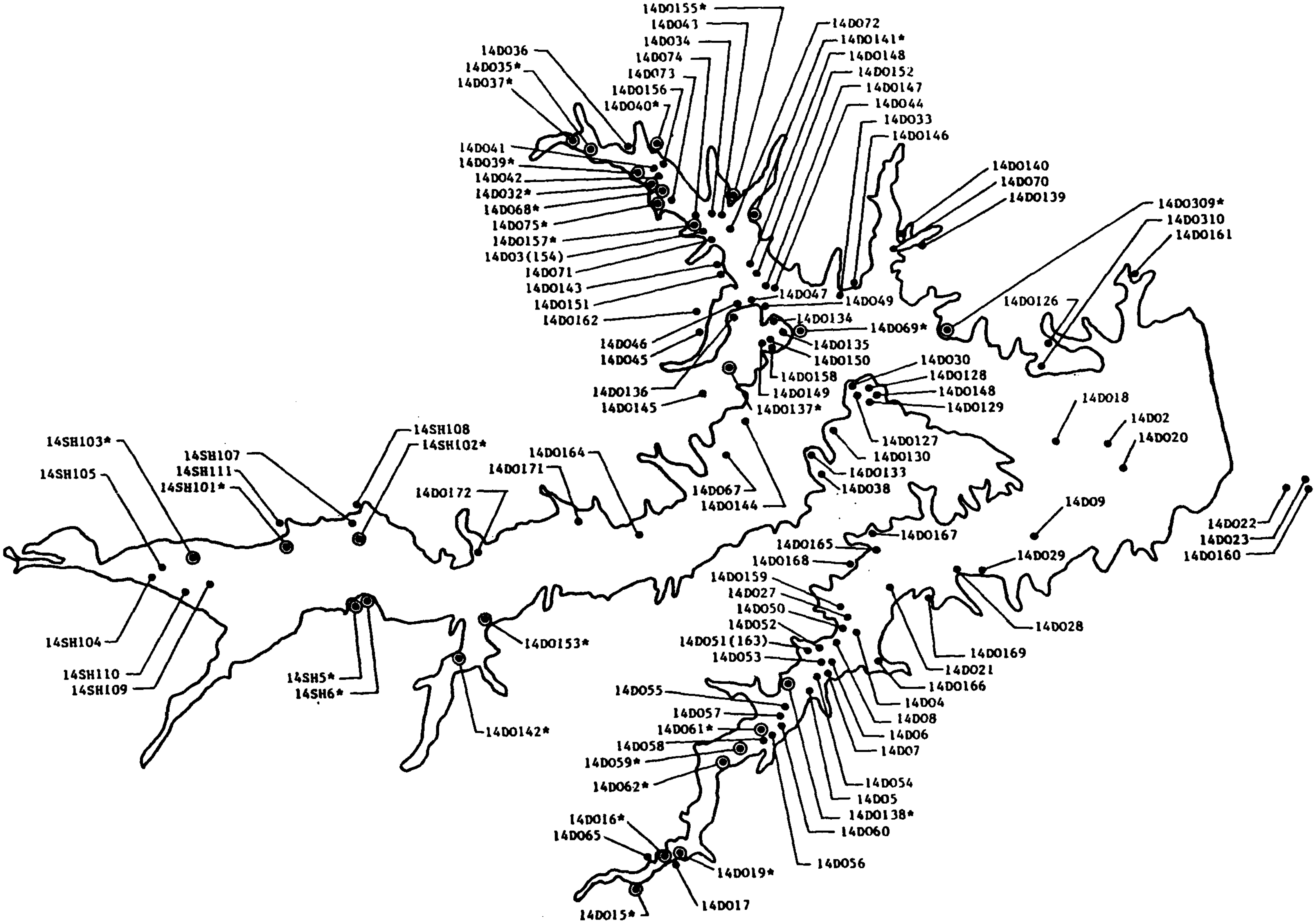


Figure 1.2. Location of all archaeological sites in the Clinton Lake Project Area. The 27 investigated sites are indicated by circled dots and asterisks.

Table 1.1. Sites investigated during the Clinton Lake Archaeological Project, 1986.

Site Number (Name)	Associated Stream	Cultural Affiliation
14DO15	Rock Creek	Pomona variant
14DO16	Rock Creek	Clinton phase
14DO19 (Hatcher)	Rock Creek	Clinton phase
14DO32 (Anderson)	Deer Creek	Plains Woodland, Maybrook phase
14DO35 (Stull)	Deer Creek	Archaic (?), Plains Woodland, Plains Village
14DO37	Deer Creek	Archaic (?), Plains Woodland, Plains Village
14DO39	Deer Creek	Pomona variant
14DO40	Deer Creek	Plains Village
14DO59	Rock Creek	Archaic (?), Plains Woodland, Pomona variant
14DO61	Rock Creek	Unknown
14DO62	Rock Creek	Plains Woodland
14DO68	Deer Creek	Pomona variant (?)
14DO69	Deer Creek	Unknown
14DO75	Deer Creek	Plains Village (?)
14DO137	Deer Creek	Paleoindian
14DO138	Rock Creek	Plains Woodland
14DO141	Deer Creek	Plains Village
14DO142	Elk Creek	Unknown
14DO153	Wakarusa River	Unknown
14DO155	Deer Creek	Pomona variant (?)
14DO157	Deer Creek	Plains Woodland, Plains Village
14DO309	Wakarusa River	Archaic, Plains Woodland
14SH5	Wakarusa River	Plains Woodland, Plains Village
14SH6	Wakarusa River	Unknown
14SH101 (Richland)	Wakarusa River	Archaic (?), Plains Woodland (Deer Creek phase), Plains Village (?)
14SH102	Wakarusa River	Unknown
14SH103	Wakarusa River	Plains Woodland (Deer Creek phase)

Research Goals

The research goals for the Clinton Lake Archaeological Project, outlined in the Research Design, concerned four aspects of the study area's human prehistory. These topics are culture history, site function (i.e., activities) vis-a-vis artifact typology, lithic resource procurement, and settlement patterns. These study domains are, of course, interrelated and are addressed separately only for the convenience and clarity of data presentation.

Culture History: Stochastic change plays a role in culture process. One example of this kind of process is the changes in ceramic decoration that provide us with one means of relative temporal control in the identification of site components. However, culture history is primarily understood as an adaptive process, characterized either by the adjustment of human populations to changes in the physical and social environment that occur through time, or by the maintenance of stability under more static conditions. In order to achieve an understanding of the causes underlying cultural processes of change, we must operate from a reliable and relatively complete cultural chronology. The current state of our knowledge of the culture history of the study area is described in its regional context in chapter 4 of this report. Data recovered from the 27 investigated sites are interpreted from a culture-historical perspective in order to augment our current knowledge of this chronology. Excavations were also undertaken with the aim of identifying, confirming or revising the previously suggested cultural affiliations of the selected sites.

Site Function: If we are to successfully interpret the settlement patterns of past peoples, a good measure of their means of adaptation to their environment, we must not only know the chronological placement of individual sites, we must also understand the particular function, or role, of these sites with respect to each other. For example, were some sites inhabited primarily for purposes of obtaining the raw materials need for manufacture of chipped stone tools or for obtaining foodstuffs? Interpretations of the variety of activities that occurred at each of the investigated sites must be considered tentative in the light of the fact that the recovered assemblages are the result of limited surface collections and test excavations. Nonetheless, a general impression of the nature of activities that took place can be obtained from a review of the functional nature of some artifacts, features, and structures. These activities and the evidence from which they are inferred are: 1) food processing and storage (pottery, cache pits), 2) animal procurement (both game hunting and mussel collection) and processing of game (projectile points, knives, animal remains), 3) scraping of wood or hide (scrapers, notches, and other unifacially retouched flakes), 4) lithic tool production and/or maintenance (debitage and cores), 5) woodworking (axes, celts, abraders), 6) plant food processing (grinding stones), 7) use of fire for cooking or heat (hearths, hearthstones, burned earth), 8) occupation of structures (daub, postmolds), and 9) social interaction (trade goods or status items, evidence of mortuary practices).

Lithic Resource Procurement: The human prehistory of North America is about stone-age peoples. It is not surprising then that archaeologists concerned with these peoples pay much attention to the activities involved in the stages of production of chipped stone and groundstone tools in order to understand them. As the problem domains discussed above make clear,

many of our interpretations about culture history and site activities stem from functional and temporal inferences based upon the examination of stone tools. Similarly, if we are to understand the settlement behavior of stone-age societies, we must determine the extent to which the nature and location of the raw materials of lithic tool production and the means of procuring these materials influenced the way they distributed themselves on the landscape. In the next chapter, the types and relative abundances of various stone resources in the study area are discussed and in chapter 7, the use of these resources is described.

Settlement Patterns: The patterned distribution of sites on the landscape reflects the nature of past human adaptations. Human populations distribute themselves (i.e., their settlements) with regard to those resources necessary for their survival. These resources not only include lithic materials but also the plants and animals utilized for food, clothing, and shelter. The correlation between site distributions and resources, as well as changes in the nature or extent of resources and corresponding changes in site distributions, can lead to hypotheses about past human adaptations and the causes underlying culture change. Sites or site networks that provide information concerning past settlement patterns can be considered significant in terms of their eligibility for the National Register of Historic Places.

Important to an accurate grasp of past settlement patterns in a riverine setting, such as the Wakarusa River basin, is an understanding of those fluvial processes of landscape evolution that may have effected site preservation through floodplain aggradation (site burial), down-cutting (sites preserved on terraces), or lateral planantion (site erosion). Post-occupation processes such as these may sometimes be extensive enough to modify the perceived distribution of sites (e.g., Thompson and Bettis 1980, 1981; Bettis and Thompson 1981; Bettis and Benn 1984; Turnbaugh 1977, 1978). Moreover, the relationship between past societies and their physical environment would have been affected by the nature of the landscape at the time of site occupation. For these reasons, the Clinton Lake Archaeological Project included a geomorphic component (see chapter 3).

Previous Investigations

Professional archaeological investigations in the Clinton Lake Project area began with a survey by the University of Kansas in 1965. This survey resulted in the recording of 69 sites, 58 of which are located within the reservoir pool (Chism 1965). Chism (1965) recommended excavation of 24 sites. Thirteen of the sites recorded during that investigation were also investigated during the Clinton Lake Archaeological Project reported herein. A follow-up project of survey and excavation by the same institution in 1966 resulted in the recording of additional sites, including 14DO75, which was investigated as a

part of the current project, and the excavation of 11 of the sites recommended by Chism for testing (Johnson 1968). Four of the latter sites, 14DO19, 14DO32, 14DO35, and 14DO68, were also tested during the current project.

An archaeological reconnaissance of the Wakarusa Watershed Management Area in Douglas, Osage, Shawnee, and Wabaunsee counties was conducted by the University of Kansas in July 1968 for the National Park Service (Quade 1969). The Clinton Lake Project area is enclosed within this management area. Forty-nine sites were recorded as a result of that survey, with 37 components assigned to the Archaic (6), Woodland (14), and Central Plains Tradition (17) periods. None of these sites is included in the current contract between Kaw Valley Engineering and the Corps of Engineers.

A survey of previously unsurveyed and inadequately surveyed land in the Clinton Lake area by Iroquois Research Institute was conducted in 1976. Thirty-eight sites were investigated as a result of that survey, including 28 sites which had not been previously recorded (Chambers et al. 1977). Eighteen sites were recommended for test excavation in order to determine cultural affiliation and eligibility for the National Register of Historic Places. Two of these, 14DO137 and 14DO309, were investigated under the current contract. Six sites were recommended for periodic examination. Five of these, 14DO59, 14DO62, 14DO138, 14SH5, and 14SH6, were tested under the current contract.

During the summer of 1978 and the spring of 1979, Iroquois Research Institute conducted additional survey and testing in the Clinton Lake area (Nathan 1980). The survey program resulted in the discovery of nine prehistoric and 19 historic sites. Four of the former were recommended for testing in order to determine their National Register eligibility. Three of these, 14DO155, 14SH101, and 14SH103, were tested under the current contract. Two other sites recorded but not recommended for further work, 14DO157 and 14SH102, were also investigated during the Clinton Lake Archaeological Project. Of the sites tested as a result of the IRI project, four were regarded as potentially eligible for the National Register. One of these sites, 14DO137, was investigated during the current contract.

Report Organization

Chapters 2 through 4 of this report contain background information essential to interpretation of the data recovered from the sites investigated during the project. The environmental context of the study area is described in chapter 2 of this report. In chapter 3, the geomorphology of the area is discussed. These two chapters provide crucial information for later discussions of prehistoric lithic procurement practices and settlement patterns. In chapter 4, the culture history of the study area is discussed in the context of the history of the broader region of northeastern Kansas and northwestern

Missouri. This region was selected because it shares a common cultural heritage with the Clinton Lake area and archaeological investigations in it provide the basis for a more detailed picture of the history of the study area. Moreover, the data outlined in that chapter provide a means of comparison to data recovered from the investigated sites and determination of their cultural affiliations.

Chapters 5 through 9 contain information on the methods of investigation and the results of their application to the 27 sites. General methods of investigation, including field techniques and laboratory procedures, are described in chapter 5. Chapter 6 contains detailed descriptions of each site, its previous investigations, specific methods of investigation, assemblage composition, and a brief recommendations concerning its National Register eligibility. Site assemblages are described in more detail in chapters 7 through 9. Lithic artifacts, including tools and the by-products of their manufacture, are the subject of chapter 7. Lithic resource procurement and the preference for certain types of local raw materials for tool production are topics addressed in that section of the report. Ceramic artifacts are described in chapter 8, particularly as they provide information concerning the cultural affiliation of the sites from which they were recovered. Analyses of biological data are the subject of chapter 9. These include discussions of botanical remains (plant, pollen and opal phytoliths), faunal materials, and human remains.

Finally, chapter 10 summarizes the information from the previous chapters and weighs it in terms of its potential for providing significant insights to the prehistory of the study area, particularly with regard to the specific research goals of this project. On that basis, recommendations for the National Register eligibility or ineligibility of each site are provided. Pertinent data on some artifact assemblages are provided as appendices to the report.

Chapter 2

THE ENVIRONMENTAL CONTEXT

Brad Logan

In the following discussion of the environment of the study area, significant changes during Quaternary time are described. In particular, Late Pleistocene and Holocene climatic fluctuations and attendant changes in the composition of prairie-forest communities and their associated faunas are emphasized. It is suggested that the participation of groups of hunter-gatherers and hunter-gatherer-gardeners in such a dynamic ecosystem may have been characterized by corresponding cultural dynamics, particularly in regard to settlement-subsistence systems, throughout the prehistoric period of human presence in the study area.

Physiography

The Wakarusa River is the largest right bank (i.e., southern) tributary of the Kansas River. Its headwaters are located in the eastern portion of Wabaunsee County, whence it flows generally eastward about 80 km through Shawnee County to enter its parent stream near the town of Lawrence in Douglas County. Wakarusa River basin is located in the Attenuated Drift Border, a minor but distinctive division of the Dissected Till Plains section of the Central Lowland physiographic province (Schoewe 1949). This region, like that of the Dissected Till Plains as a whole, was glaciated during the early Pleistocene Epoch. Evidence of this exists in the form of isolated patches of glacial till, outwash, and other erratics. However, the eastward facing escarpments that characterize the topography of the Osage Cuestas to the south and that are mantled by till and loess in the Kansas Drift Plains to the north are evident in the Attenuated Drift Border. While not as bold as the cuesta terrain to the south, the topography of the study area presents greater relief that the rolling hills north of the Kansas River valley.

Structural Geology

A description of the exposed bedrock formations in the study area is necessary since local lithic materials, including limestone, sandstone, till, ferrous oxides (hematite and limonite), and, especially, chert, were utilized by the area's prehistoric inhabitants. The study area occurs in the Forest City Basin, a midcontinental structural feature that was a shallow sea during Upper Pennsylvanian time (Moore et al. 1944). This sea was subject to a series of transgressive and regressive episodes, or cyclothems, that resulted in the deposition of materials that appear today as alternating beds of limestones and shales. Groups of these alternating beds are assigned to two stages, Missourian and Virgilian, of the Upper

Pennsylvanian Epoch. At least thirteen of the limestone beds of these groups bear cherts (Reid 1979; Logan 1988), the raw material most frequently utilized by the stone-age populations of the Central Plains.

Bedrock exposures in the Wakarusa River basin are largely those of the Virgilian Stage. Missourian Stage outcrops occur only in the eastern half of Douglas County. The most extensive outcrops in the study area are those of the Douglas and Shawnee Groups of the Virgilian Stage (Moore 1949). The Douglas Group is a "shallow water sequence of sandy shales and a few limestone tongues" (Branson 1962:448). None of these limestones contains any cherts (Ball 1964; Reid 1981). Three known chert-bearing limestone members occur in the Shawnee Group, including the Ervine Creek Limestone member of the Deer Creek formation and the Toronto and Plattsmouth limestones of the Oread formation (O'Connor 1960).

Little information is available for the cherts of the Ervine Creek limestone. O'Connor (1960:46) notes that "sparse chert nodules" occur near the middle of this 13 to 17 feet thick member but fails to provide a description of them. Chambers and others (1977:53) tentatively ascribe a "grey to brown non-fossiliferous" chert in the study area to the Ervine Creek limestone.

By far the more abundant and easily recognized cherts in the study area are those of the Oread formation. The Toronto limestone cherts occur as scattered, yellow brown nodules common in the upper part of the member (O'Connor 1960:38). More recent research concerning the appearance of nodules and artifacts of this material at archaeological sites in northeastern Kansas has resulted in a more complete description (Logan 1985). Toronto cherts range in color from white to pale-brown and yellowish brown, are medium to fine-grained in texture, homogenous, and relatively fossil-free. Plattsmouth cherts range from light to dark gray in color, are fine-grained in texture, and contain abundant silicified fossils, especially of fusilinids (Reid 1979; Logan 1985). They are the most ubiquitous cherts in the study area. In some areas where both Plattsmouth and Toronto cherts occur together, the latter seem to have been the preferred resource, despite the fact that the former are invariably more abundant (Logan 1988). Discussion of the influence of these cherts on prehistoric lithic procurement and settlement activities is presented in chapter 7.

Hydrology and Drainage

The Wakarusa River, prior to construction of Clinton Dam, was characterized by flooding of sometimes extensive proportions. Major floods during the 19th and early 20th centuries include those of 1844 and 1845 (Barry 1972: 510, 516), 1895, 1904, 1921, and 1932 (Chambers *et al*. 1977:41). At least 90% of the Wakarusa River valley is composed of Newman Terrace (Dufford 1958), which is about 6 m (20 ft) above the average

low-water stream level of much of the Wakarusa River (O'Connor 1960). This terrace was, prior to construction of Clinton Dam, still subject to vertical accretion during times of flood (cf. Davis and Carlson 1952). According to O'Connor (1960:61), "ordinary floods cover the Newman Terrace in the Wakarusa River valley to depths of a few inches to a few feet, but only severe floods cover this terrace in the Kansas River valley". Obviously, flooding would have been a major factor in the settlement decision-making of the study area's prehistoric inhabitants. Moreover, sedimentation associated with flooding may have resulted in burial of some prehistoric sites on the Newman Terrace.

Chapter 3 contains a more detailed discussion of the evolution of the study area's landscape, with particular reference to terraces and to the nature of its soils.

Climate

The climate of northeastern Kansas is continental and is characterized by large diurnal and annual variations in temperature, which ranges from 20° to 67°F. from November to February and from 32° to 90°F. from March to October (Table 2.1). The climate of this region is described as moist subhumid (Thornthwaite 1941). Precipitation often exceeds evapotranspiration with the surplus either running off or soaking into the soil and replenishing ground water. Precipitation averages 37 to 38 inches annually and more than 70% of this occurs from April through September in the form of convectional thunderstorms (Table 2.2).

Table 2.1. Average Daily Maximum and Minimum Temperatures by Month in the Study Area (recorded at Lawrence, Kansas from 1941 to 1970).

Month	Average Daily Maximum	Average Daily Minimum
	°F.	°F.
January	39.9	20.6
February	45.8	25.1
March	54.7	32.4
April	68.3	45.4
May	77.0	55.2
June	84.8	64.2
July	89.9	68.3
August	89.1	67.1
September	81.4	58.3
October	71.4	48.2
November	55.5	35.0
December	43.3	25.2
Year	66.9	45.2

From Dickey and others (1977:69).

Table 2.2. Average Monthly Total Precipitation in Douglas County (recorded at Lawrence, Kansas, 1941-1970).

Month	Average Monthly Total (inches)
January	1.10
February	1.18
March	2.40
April	3.76
May	4.23
June	6.04
July	4.68
August	4.20
September	3.76
October	3.04
November	1.57
December	1.44
Year	37.40

From Dickey and others (1977:69).

Snowfall averages 18 to 20 inches a year but is evenly distributed throughout the winter months (Bark 1977). Data on first and final freezes for the study area are presented in Table 2.3. The clash of warm, moist air masses from the Gulf of Mexico and cold, dry, polar air sometimes results in high intensity, flood-producing storms (Soil Conservation Service 1959). The area is not immune to the effects of other harsh climatic conditions, including blizzards, tornadoes and other severe windstorms, and droughts.

Table 2.3. Probability of Last Freezing Temperature in Spring and First in Fall for Douglas County.

Probability	16°F or lower	20°F or lower	24°F or lower	28°F or lower	32°F or lower
Spring:					
1 year in 10 later than	3/25	4/2	4/9	4/19	5/2
2 years in 10 later than	3/19	3/27	4/4	4/14	4/27
5 years in 10 later than	3/7	3/17	3/26	4/4	4/17
Fall:					
1 year in 10 earlier than	11/14	11/6	10/26	10/17	10/8
2 years in 10 earlier than	11/20	11/11	10/30	10/22	10/12
5 years in 10 earlier than	12/2	11/22	11/8	10/31	10/22

From Dickey and others (1977:70).

Artz (1983a) has suggested that convectional storms did not always dominate the precipitation pattern in the Central Plains during the time of prehistoric occupation (cf. Knox 1983). Geomorphic evidence from the lower Walnut River valley in the Flint Hills of east-central Kansas and Cotton Creek valley on the border between the Flint Hills and Cherokee Prairie in northern Oklahoma demonstrates the prevalence of frontal storms from 4500 until 2000 BP in the former area and 1300 BP in the latter area. Similar shifts from frontal to convectional storm dominance may also have occurred in northeastern Kansas.

Paleoclimatic fluctuations have been inferred from the pollen spectra at Muscotah and Arrington marshes, in the Delaware River basin, about 64 km (40 mi) north of the study area (Gruger 1973). These data, their reflection of environmental dynamics, and their implications for the adaptations of prehistoric groups are reviewed in the following section.

Vegetation

During the late Pleistocene, the study area was part of an ecotone of two major biomes, the spruce forest of eastern North America and the montane conifer parkland that dominated the west and southwest (Gruger 1973). The pollen data from Muscotah and Arrington marshes reveal the presence of open vegetation, with some pine, spruce, and birch trees and local stands of alder and willow from at least 23,000 to 15,000 BP. An ecotone of grassland and deciduous woodland was established by at least 11,000 BP. It is not known how long it took for this ecotone to replace the coniferous forest biome that dominated northeastern Kansas during the Woodfordian stage of the Wisconsinan glaciation. An unconformity occurs between zones 2 (Woodfordian) and 3 (early Holocene) at Muscotah Marsh which precludes more accurate reconstruction of this important process. It is unfortunate from an archaeological point of view as well, since it is known that the area was inhabited by Paleoindians during that crucial transition period.

An abrupt increase in the percentage of Ambrosia and Franseria pollen marks the transition from zone 3 to zone 4 at Muscotah Marsh. This indicates an expansion of the prairie community, a phenomenon that occurred throughout the Midwest during the mid-Holocene (McAndrews 1966; King 1980). In northeastern Kansas, this prairie interval is dated at 9930±300 BP. The time transgressive nature of the process is demonstrated by dating of prairie expansion in Minnesota and South Dakota at ca. 8000 BP (McAndrews 1966) and in southeast Missouri at ca. 8700 BP (King and Allen 1977). Zone 4 pollen frequency curves demonstrate the dynamic nature of the prairie-forest ecotone. In zone 4a, grasses and deciduous trees are both represented, although the latter account for only about 20% of the pollen. Zone 4b reflects a decided regression of woodland components of this ecotone. Trees disappeared from the uplands and low

values of some types of arboreal pollen suggest that the Delaware River floodplain "dried out over extensive areas" (Gruger 1973:245). This phenomenon would have occurred in the nearby Wakarusa River basin as well.

Zone 4c reflects a period of forest expansion and the eventual re-establishment of the ecotone that existed during the deposition of zone 4a. The transition from the prairie interval to the initial forest encroachment represented in zone 4c is dated to 5100±250 BP. Although the time transgressive nature of this episode is reflected by dating of this process in Minnesota at ca. 4000 BP (McAndrews 1966), in southeast Missouri it occurred at approximately the same time, ca. 5000 BP (King and Allen 1977).

The prairie-forest environment established after the Hypsithermal (post-Pleistocene climatic maximum, Wright 1976) was, essentially, the modern ecotone. However, subsequent climatic episodes of increased moisture (e.g., the Atlantic) or increased aridity (e.g., the Pacific) would have affected the distribution of woodland and grassland communities. This modern ecotone is transitional from the oak-hickory forest of eastern North America to the tallgrass prairie of the Interior Plains and forms one of the most "conspicuous and important" examples of the ecotone concept (King and Graham 1981:131). It extends some 1,920 km from 30^{o} to 45^{o} N. Lat. and extends from east to west in the case of some species, such as bur oak, as much as 1,600 km. Shelford (1963:306-307) estimates that within the region of at least 932,400 km^2 that contains interspersed climax forest and prairie, approximately four million hectares are covered by forest-edge vegetation. Prairie-forest ecotone occurs in limited areas of Minnesota, Michigan, Ohio, and Indiana and in more extensive areas of Iowa, Illinois, eastern Nebraska, eastern Kansas, northern Missouri, and eastern Oklahoma (Transeau 1935; Shelford 1963; Kuchler 1964). The Wakarusa River basin occurs within such an ecotone (Fig. 2.1).

The pre-settlement (i.e., pre-Euro-American) ecotone in Wakarusa River basin was a mosaic of both prairie and woodland communities and, according to Kuchler (1974:588),

> the species of one type are not mixed with those of the other, and each of the two vegetation types involved retains it discrete character. The oak-hickory forest does not gradually open up into a savanna but keeps its identity; the bluestem prairie does likewise. Therefore, in eastern-most Kansas, forests with islands of prairie gradually change westward into a forest-prairie mosaic and finally into prairie with forest islands.

Table 2.4 is a list of the dominant species of the two plant communities that compose the ecotone of the study area.

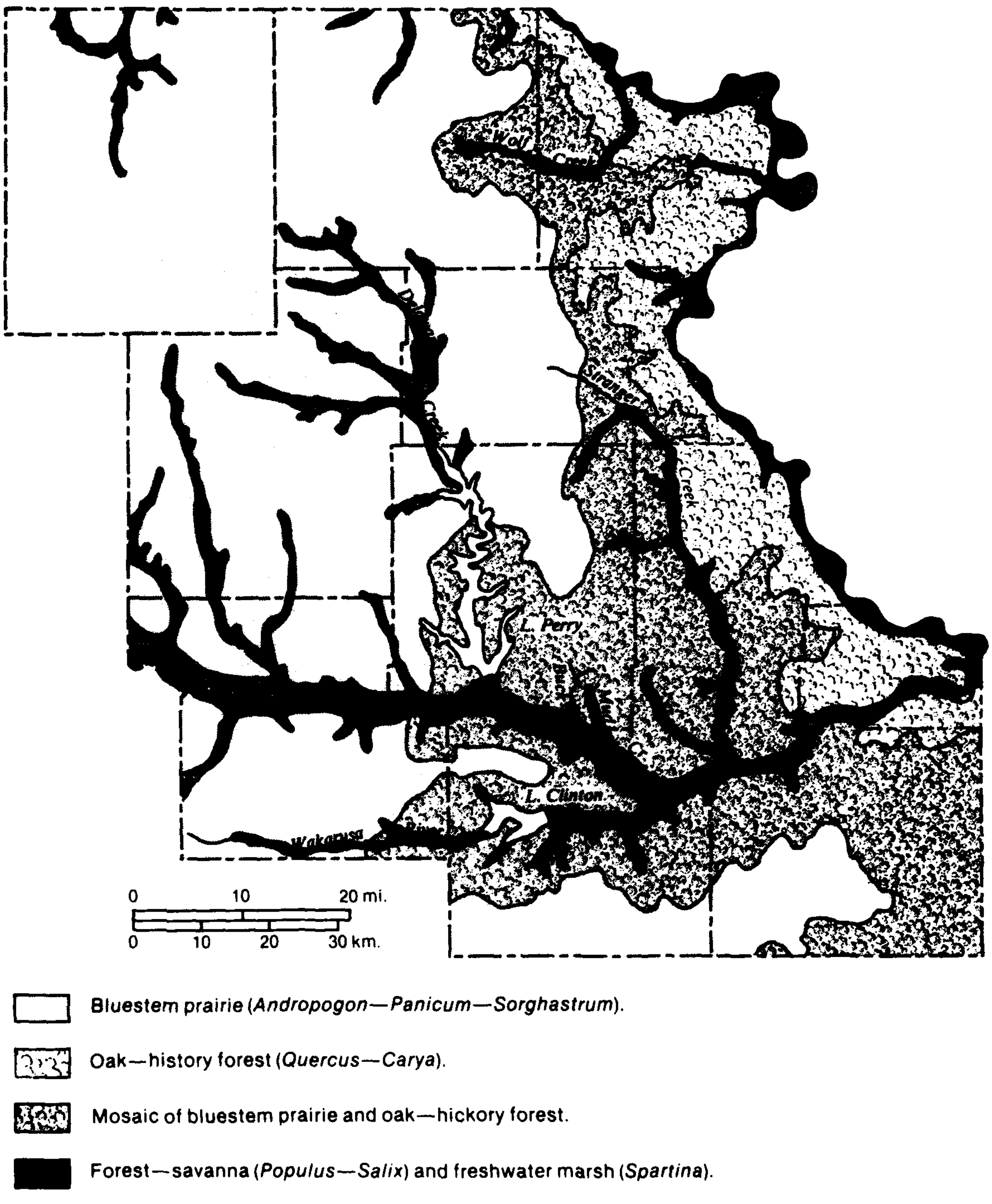


Figure 2.1 Map of the potential natural vegetation of the study area and vicinity. Note the location of Clinton Lake with regard to the prairie-forest ecoton. Adapted from Kuchler (1974).

Table 2.4. Dominant Plant Species in the Study Area.

Common Name	Scientific Name
	Bluestem Prairie
Big Bluestem	*Andropogon gerardi*
Little Bluestem	*Andropogon scoparius*
Switchgrass	*Panicum virgatum*
Indian grass	*Sorghastrum nutans*
	Oak-Hickory Forest
Bitternut Hickory	*Carya cordiformis*
Shagbark Hickory	*Carya ovata*
White Oak	*Quercus alba*
Red Oak	*Quercus borealis* var. *maxima*
Black Oak	*Quercus velutina*

Data from Kuchler (1974).

Kuchler (1974:600-601; Fig. 2.1) proposes a natural flood plain vegetation for the study area of forest and freshwater marsh. Dominant trees in such a community are hackberry (*Celtis occidentalis*), cottonwood (*Populus deltoides*), black willow (*Salix nigra*), and American elm (*Ulmus americana*). In poorly drained areas of the Wakarusa River flood plain, such as abandoned meanders and shallow depressions, marshes would develop. The dominant vegetation in such places today is prairie cordgrass (*Spartina pectinata*).

A prairie-woodland ecotone is a tension zone sensitive to climatic fluctuations. The relative distribution of the two plant communities is affected by changes in the amount of precipitation of significant duration. Shelford (1963:317) describes this dynamic process:

> Dry and rainy periods of longer or shorter duration have alternated over thousands of years. During long, wet periods, forests expand from groves and stream-skirting strips to take possession of prairie areas. Some forests in Iowa and Illinois are now growing on black prairie soil that is 20 to 36 inches (50-90 cm) deep. During long, dry periods the process has been reversed. Grasses invade wooded areas and kill the shrubs and trees probably by monopolizing the water supply through a superior system of deep roots. Most of this competition between forest and prairie communities goes on in the shrubby edge that separates them.

It has been demonstrated that globally synchronous climatic shifts have occurred throughout the Holocene (Bryson et al. 1970) and that these may have correlated with cultural adaptations in North America in general and in the Great Plains in particular (Wendland and Bryson 1974; Lehmer 1970; Wedel 1970). Evidence of forest invasion onto prairie soils during the Neo-Boreal climatic episode (ca. A.D. 1550-1830) has been found in Platte and Boone counties, Missouri (Logan 1979; Howell and Kucera 1956; Reeder et al. 1983) and in Iowa (Dick-Peddie 1952; Loomis and McComb 1944). Fitch and McGregor (1956) have noted that the forest was from 0.8 to 1.6 km wide on both sides of the Kansas River in the vicinity of the study area at the time of the Government Land Office surveys (1855-1860). Given the evidence of past climatic fluctuations in the Midwest ecotone region, there is reason to believe that similar periods of forest recession have occurred in the study area in the past. Because of its ecotone setting, the study area provides an ideal laboratory for determining how prehistoric inhabitants of the prairie-plains border responded to such changes in their physical environment.

Fauna

Animals that inhabited the study area and its vicinity during the late Pleistocene (Wisconsinan) reflect the mixed environment of montane conifers and open grasslands indicated by the pollen spectra from Muscotah Marsh. Skeletal remains of now-extinct, late Pleistocene megafauna are occasionally recovered from alluvial deposits in the Kansas River below the mouth of Wakarusa River (Martin et al. 1979; Kost 1984). These include animals of the *Symbos-Cervalces* faunal province, associated with Pleistocene spruce forests in eastern North America (Martin and Neuner 1978), such as American mastodon (*Mammut americanum*), woodland musk-ox (*Symbos cavifrons*), woodland peccary (*Mylohyus*), and stag-moose (*Cervalces*). In alluvial deposits in the Kansas River basin to the west of the study area, the remains of animals of the *Camelops-Navahoceras* faunal province, associated with montane conifer parkland, are more frequently found. These include mammoth (*Mammuthus*) and camel (*Camelops*). The presence of a spruce-montane conifer parkland ecotone in or near the study area at a time when it was probably populated by small bands of big-game hunters has great implications for the study of Paleoindian cultural adaptations (Martin et al. 1979; Rogers and Martin 1982; Rogers and Martin 1983; Brown and Simmons 1984).

The modern animal life of the study area reflects the existence of grassland and woodland communities as well as the destructive effects of Euro-American settlement. These effects either directly, through over-kill, or indirectly, through reduction of habitat, have included the extirpation of bison (*Bison bison*), wapiti (*Cervus elaphus*), grizzly bear (*Ursus arctos*), black bear (*Ursus americanus*), wolf (*Canis lupus*), prairie chicken (*Tympanuchus cupido*), wild turkey (*Meleagris gallopavo*) and other animals whose ranges might have extended

to Wakarusa River, such as mountain lion (Felis concolor) and antelope (Antilocapra americana). Other animals still extant in the area that, like those above, were important to the area's prehistoric inhabitants include white-tailed deer (Odocoileus virginianus), coyote (Canis latrans), red fox (Vulpes vulpes), gray fox (Urocyon cinereoargenteus), raccoon (Procyon lotor), badger (Taxidea taxus), bobcat (Lynx rufus), mink (Mustela vison), long-tailed weasel (Mustela frenata), striped skunk (Mephitis mephitis), squirrel (Sciurus niger and Sciurus carolinensis), and woodchuck (Marmota monax) (Bee et al. 1981). Other animals that figured in the subsistence economy of the prehistoric population of the area included a variety of mussels, fish, amphibians, reptiles, and birds of the aquatic, woodland, and grassland communities.

Fitch (1965:50-57) provides a comprehensive list of fauna identified at the University of Kansas Natural History Reservation and Rockefeller Experimental Tract. This "natural area" includes a tract of 590 acres in Section 4, Township 12 South, Range 20 East and the SW 1/4, Section 33, Township 11 South, Ranger 20 East in Douglas and Jefferson counties. The reservation is only about 16 km (10 mi) northeast of Clinton Dam. The list includes the following numbers of species: snails and slugs (28), clams (2), earthworms (1), crustaceans (10), chiggers (22), spiders (191), butterflies (21), moths (226), ants, bees, and wasps (Hymenhoptera- 33), crickets, grasshoppers, kaytdids, and roaches (Orthoptera- 32), beetles (165), fishes (5), amphibians (10), reptiles (27), birds (179), and mammals (33). Aquatic habitats on the reservation do not include the slow moving, muddy or sandy bottomed, perennial streams required by such invertebrates as mussels. The variety of fishes in the Reservation is considerably less than would have been available to prehistoric peoples in the study area but this also reflects less diversity in aquatic habitats in comparison to the Wakarusa River basin. The listing is valuable, however, in that it demonstrates how a small tract of "natural" (the tract is actually maintained for experimental purposes) ecotone can support a wide variety of animal species.

Not only does the number of species increase along a tallgrass/oak-hickory forest edge, the population density of some animals also rises above that of adjacent communities (Odum 1971:157-159; Bee et al. 1981:9). This "edge effect" may have played an important role in the settlement and subsistence activities of prehistoric peoples who are known to have depended to a significant extent on such forest edge game as white-tailed deer. In northeastern Kansas and northwestern Missouri, this animal was consistently favored over such prairie game as elk and bison from at least the Late Archaic period (e.g., Adair 1977; Artz 1978; Johnson 1972; Wedel 1943:27, 72-73 and 1959:664).

The bias toward deer may have reflected the relatively low population density of bison in the tallgrass community of northeastern Kansas during the Late Holocene. Skeletal remains of

Early Holocene bison are found much more frequently in alluvial deposits of the Kansas River than those of Late Holocene bison. This constrast may be attributable to the prairie expansion that occurred during the post-glacial thermal maximum (Rogers and Martin 1983). The low density of modern bison in northeastern Kansas is also reflected in the absence of any mention of bison in the region by early Euro-American explorers and settlers (cf. Logan 1985).

The white-tailed deer population in the study area is monitored and controlled today by the Kansas Fish and Game Commission. Most of the study area falls within a section of the state that has a medium distribution and density of deer. Some areas of northeastern Kansas are known to support a high density and distribution of deer, according to the Kansas State Cooperative Extension Service (cited in Corps of Engineers 1981:77). Wakarusa River basin undoubtedly supported a larger population of deer and other woodland edge game during presettlement time. Based on the accounts of Lewis and Clark, who reported seeing large numbers of deer on the prairie-forest edges along the Missouri River in the summer of 1804, Shelford (1963:314) suggests their population at that time may have been as high as 20 deer per km^2 of river-skirting forest. However, climatic fluctuations, such as the Hypsithermal, that resulted in the expansion of prairie at the expense of woodland would have reduced population size and affected density and distribution. Consequently, the subsistence activities of human populations would also have been affected.

Chapter 3

GEOMORPHOLOGY OF THE WAKARUSA RIVER VALLEY, NORTHEASTERN KANSAS

Rolfe Mandel

Introduction

This chapter focuses on the geomorphology and near-surface stratigraphy of the Wakarusa River valley in the area of Clinton Lake. The geomorphic investigation included general terrain analysis and field examination of specific landforms, geomorphic surfaces, sediments and soils. Absolute and relative dating techniques were used to construct a chronology for alluvial sediments in the Wakarusa River Valley. The information gained from this investigation provides a better understanding of late Quaternary landscape evolution in the study area. The recognition of landscape change, both through time and space, is vital for interpreting variability in the archaeological record.

Previous Investigations of the Quaternary Geology of the Lower Kansas River Drainage System

There is relatively little information on Quaternary landscape evolution in the Wakarusa River valley. Previous archaeological investigations conducted in the area of Clinton Lake (i.e., Chism 1966; Johnson 1968; Chambers et al. 1977; Nathan 1980) did not provide detailed geomorphic data. However, the Wakarusa River is in a portion of the Kansas River drainage net that has yielded time-stratigraphic information. This information may be used to infer the history of landscape evolution in the Wakarusa River valley.

Four terraces have been mapped within the lower Kansas River drainage net (Davis and Carlson 1952; McCrae 1954; Beck 1959; Fader 1974; Elks 1979). They are, from oldest to youngest: Menoken terrace, Buck Creek terrace, Newman terrace, and Holliday terrace complex. These four terrace names have become established in the literature.

The Menoken terrace-fill consists of sediments that are generally considered to be pre-Illinoian in age, and the terrace surface may be the the oldest Quaternary landform in the Kansas River valley. The surface of the Menoken terrace is approximately 25-30 m above the modern floodplain. The age and origins of the Menoken terrace are virtually unknown. Davis and Carlson (1952) suggested that sediments underlying this terrace were deposited by glacial meltwater during the retreat of Kansas glacial ice. They noted that the Menoken fill consists of coarse outwash containing cobbles and boulders at the base fining upward into thicker units of sand, silt, and clay. However, in many localities, the Menoken terrace is composed of

undifferentiated till and glaciolacustrine deposits (Beck 1959; Jewett et al. 1965; O'Conner 1971). These deposits rest on bedrock benches at high elevations along the margins of the Kansas River valley. Sorenson and others (1986) suggested that the Menoken deposits and features are remnants of ice-contact deposits of various types including moraines, kames, and outwash. Thus, the deposits and features probably are not alluvial terraces even though their proximity to the Kansas River makes them an important part of the valley landscape. Therefore, the term Menoken is retained to describe an unusually amorphous form and/or series of deposits in the lower Kansas River drainage system.

The Buck Creek terrace is preserved as scattered remnants in the Kansas River valley between Eudora and Junction City, Kansas. Most of these remnants are located at the mouths of the tributary streams (Sorenson et al. 1986). The surface of the Buck Creek terrace is approximately 11-12 m above the modern floodplain of the Kansas River. Deposits underlying the Buck Creek surface consist of sand and gravel which grade upward into silt and clay (Beck 1959). The absolute age of the Buck Creek fill is not known. According to Davis and Carlson (1952), a cycle of degradation and alluviation during the Illinoian resulted in the formation of the Buck Creek terrace. However, as will be discussed later, radiocarbon evidence suggests that the upper part of the Buck Creek fill may be Wisconsinan in age.

The Newman terrace occurs throughout much of the Kansas River valley west of Eudora, Kansas. The surface of the terrace is approximately three meters above the modern floodplain of the river. However, since much of the terrace is covered with water during severe floods, it is technically considered part of the floodplain (Holien 1982).

The Newman terrace is a flat, poorly drained surface bordered by low natural levees (O'Conner 1960). Unlike the topographically lower surfaces of the valley, it is not generally marked by old meander scars. The lower part of the alluvium underlying the Newman terrace consists of coarse sand and gravel with cobbles at the base (Beck 1959; O'Conner 1960). The alluvium fines upward into dark silts, silty clays, and clays which are found everywhere beneath the terrace surface (O'Conner 1971). These fine-grained materials may represent everything from overwash to backswamp deposits and include filled-in former channels.

The fill of the Newman terrace has been dated at several locations in the Kansas River valley. Near Bonner Springs, radiocarbon dates of 4290±310 years B.P. and 10,430±130 years B.P. were determined on humates from paleosols at depths of 5.2 m and 8.8 m, respectively, below the terrace surface (Holien 1982). A radiocarbon date of 7250±110 years B.P. was determined on humic acids from a paleosol 3.65 m below the surface near Wamego, Kansas (Bowman 1985). Based on these dates,

sediments of the Newman terrace appear to have accumulated from latest Wisconsinan through mid-Holocene.

The Holliday terrace complex occurs throughout most of the lower Kansas River valley and in the lower reaches of tributary streams. The surface of the Holliday terrace is approximately two meters above the modern floodplain of the Kansas River and is often separated from it by a small natural levee (McCrae 1954). A complex pattern of meander scrolls and abandoned channels which have surface relief of up to three meters are present on the terrace surface (Holien 1982:76). The Holliday fill consists of sand and silt with fine-grained silts and clays accumulating in abandoned meander scrolls and channels. The Holliday fill has yielded radiocarbon dates of about 4290, 4260, 2620, 2395, and 1670 years B.P. (Johnson 1985; Logan and Johnson 1985).

The modern floodplain is the surface which lies at a lower elevation than the Holliday terrace complex. It is characterized by channel scars that exhibit subtle relief. The floodplain sediments are generally coarser than the alluvium underlying upper portions of the terraces and consist of coarse sands, silts, and occasional sand lenses (Holien 1982). Lateral migration of the Kansas River has removed the Holliday terrace complex at places in the river valley and as a result, the modern floodplain may be adjacent to the Newman terrace. The absolute age of the floodplain is not known, but it is suspected to be less than 3,000 years old (Bowman 1985).

Methods

The geomorphological investigation involved examination of soils and sediments exposed in backhoe trenches and archaeological test units at selected sites. In addition, floodplain and terrace deposits were examined along stream cutbanks. Soil profiles were described according to procedures outlined in the revised Soil Survey Manual (Soil Survey Staff 1981). Buried paleosols and organic-rich sediments were sampled at several locations for radiocarbon dating (see chapter 5 for laboratories used).

Correlating and dating stream terraces in the study area was accomplished by: 1) comparing elevations of terrace surfaces, 2) radiometrically dating materials from terrace deposits, 3) examining the degree of soil development on terrace surfaces, and 4) assessing the archaeological record from terrace surfaces and underlying fills. Altogether, this information contributed to our understanding of late Pleistocene and Holocene fluvial geomorphology and alluvial stratigraphy in the Wakarusa River drainage system.

Alluvial Geomorphology

Alluvial Landscapes: Alluvial landforms and features identified within the study area include natural levees,

terraces, floodplain deposits, meander scars, and alluvial fans. Of special interest to this study are the alluvial terraces.

The Wakarusa River and its major tributaries, such as Rock, Deer, Dry, and Coon Creeks, flow through valleys that contain well preserved terraces, remnants of older floodplain deposits which partially document the region's complex alluvial history. According to O'Conner (1960:60), the Newman terrace forms 90% or more of the floodplain of the Wakarusa River. Geologic maps of Douglas County (O'Conner 1960) and Shawnee County (Johnson and Adkinson 1967) show few scattered remnants of the Buck Creek terrace in the Wakarusa River valley. However, based on observations in this study, the floodplain/ terrace system of the Wakarusa River is more complex than sequences described in previous investigations.

The result of the geomorphological investigations at Clinton Lake indicate that there are two terrace surfaces, referred to as T-1 and T-2, within the Wakarusa River valley (Fig. 3.1). The T-1 terraces have broad, flat surfaces standing 2 to 3 m above the modern floodplain (T-0b). T-1 deposits are usually silty or clayey, weakly oxidized, and have soils with A/Bt/C profile sequences developed into their upper parts. Remnants of an older and topographically higher T-2 terrace are common in the Wakarusa River valley and in the lower reaches of major tributaries. The T-2 terraces have broad, flat to gently sloping, partially dissected surfaces that are 4 to 6 m above the modern floodplain. T-2 deposits are largely composed of gravels, sands, and silts, and the surface soils have A/Bt/C profiles that are moderately to strongly oxidized. One of the most notable characteristics of the T-2 terrace is that the meander scars on its surface have considerably larger wavelengths, channel widths and radii of curvature than the modern stream channels in the Wakarusa drainage system. Also in the same locations, the T-2 alluvium overlies strath surfaces developed on bedrock (see Fig. 6.34). The depth to these strath surfaces ranges from about 2 m (14DO35) to more than 4 m at 14SH101.

Two floodplain surfaces, T-0a and T-0b, were identified at elevations lower than the T-1 terrace. T-0b is usually 2 to 3 m below the T-1 surface and it is separated from the terrace by a very gentle scarp. Lateral migration of streams has removed the T-1 terrace at places in the river valley and as a result, T-0b deposits may be adjacent to the T-2 terrace. Where this stratigraphic relationship occurs, the T-0b and T-2 surfaces are separated by a prominent scarp, such as at 14SH101, 14DO32, and 14DO35. The T-0b deposits are usually silty or loamy, are less oxidized than T-1 deposits, and have surface soils with A/C profiles developed into them. Buried soils with A/C profiles often occur in the T-0b fill. Stratification may be visible in the C horizon(s). Stream channels are usually entrenched three to four meters below T-0b surfaces.

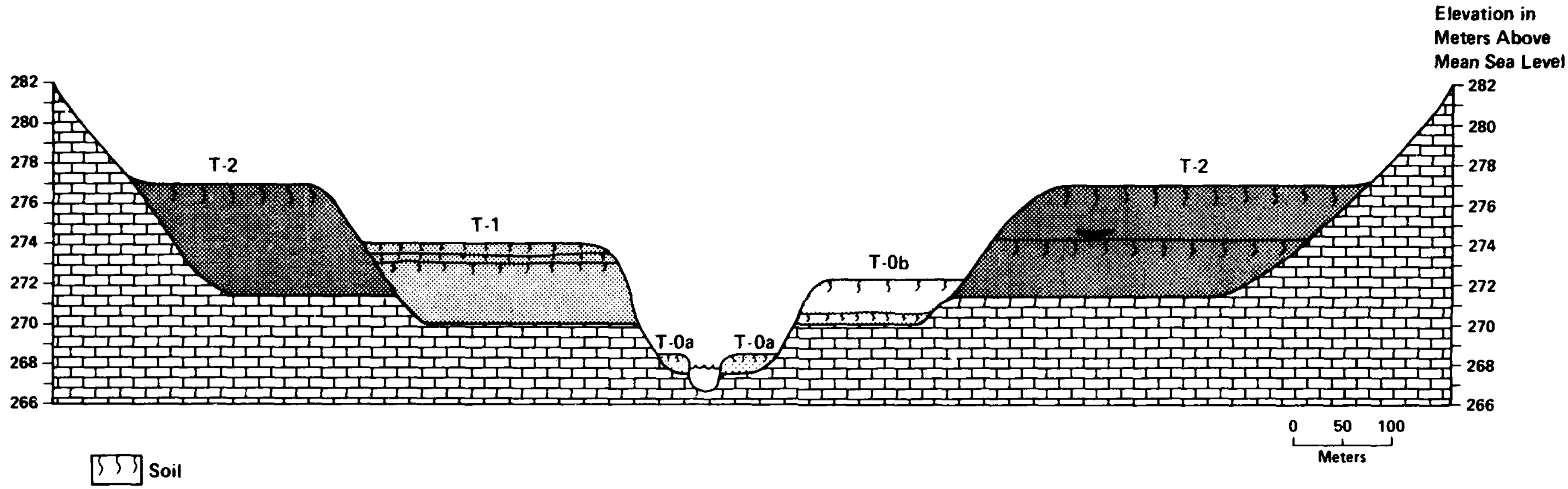


Figure 3.a Generalized cross-section of the Wakarusa River valley showing landforms and buried surfaces.

T-0a deposits occur immediately adjacent to stream channels (Fig. 3.1). The T-0a surface is generally 3 to 4 m below the T-0b, and it is often less than 50 m wide. T-0a is characterized by distinct channel scars, and its surface is frequently flooded. Soils on the T-0a surface are all Entisols with little organic accumulation and weakly developed A/C profiles that exhibit prominent stratification. T-0a sediments are usually coarser than the T-0b alluvium.

Sediment deposited during the last 100 to 150 years often has buried earlier T-0b and T-1 deposits. Agricultural and urban development have caused dramatic increases in upland erosion and the delivery of sediment to streams in the project area. Artificial raising of water levels in the Wakarusa River by construction of Clinton Lake has promoted accumulation of sediment on floodplains and low terraces. It is likely that the accumulation of "post-settlement" alluvium on floodplain and terrace surfaces has resulted in burial of some prehistoric archaeological sites.

Soil-Geomorphic Relationships

Detailed soil surveys for the two counties in the project area have been published by the Soil Conservation Service (Abmeyer and Campbell 1970; Dickey et al. 1977). Soil data gleaned from the present geomorphological investigation of the Clinton Lake area were used to verify soil-geomorphic relationships described in these surveys. In some cases there is a close association between soil series and alluvial landscapes in the Wakarusa River valley. However, the soil-geomorphic relationships are not perfect, and caution is urged in extrapolating floodplain and terrace distributions strictly on the basis of soil types. Even within small areas of the drainage basin, numerous discrepancies were noted in expected patterns of soils. Obviously, the factors that influence soil formation in the alluvial landscape of eastern Kansas are complex; soil-geomorphic relationships will vary between and among drainage systems due to slope factors, drainage, and vegetation patterns. In addition, the Douglas and Shawnee County soil surveys, like other soil surveys published by the Soil Conservation Service, are composed of soil maps of varying degrees of generalization. In some instances, similar soils on different landscapes are grouped together into a single soil series. Also, major changes in soil classification coincided with the period of soil mapping in northeastern Kansas, and many different individuals worked on the soil-survey reports, resulting in some disparity in the recognition and mapping of soils in the Wakarusa drainage system. Despite these limitations, the soil surveys are useful guides to landscape interpretation in the project area. Table 3.1 shows soil-geomorphic relationships in the Wakarusa River valley, as described by Abmeyer and Campbell (1970) and Dickey and others (1977).

Table 3.1. Soil-Geomorphic Relationships in the Wakarusa River Valley.

Landform	Soil Series	Soil Order
T-0a	Channeled Kennebec	Entisol
T-0b	Kennebec	Mollisol
T-1	Wabash, Reading	Mollisols
T-2	Gymer*	Mollisol

* only in Douglas County

Principal soils on the T-0a and T-0b surfaces are the channeled Kennebec and the Kennebec series, respectively. The channeled Kennebec soils are variants of the Kennebec series. Since the channeled Kennebec soils are subject to frequent flooding, they are not stable enough to develop an organic-rich A horizon. In contrast, the less frequently flooded Kennebec soils on the higher T-0b surfaces are better developed and have greater organic-carbon contents than the channeled Kennebec. However, both soils lack B horizons.

Principal soils on the T-1 terrace are the Reading and Wabash series. The Reading soil is a Mollisol formed in silty alluvium probably derived from natural levee deposits. The Bt horizon of the Reading soil ranges from brown to very dark brown and exhibits strong structural development. The Wabash soil is also a Mollisol, but it is formed in clayey alluvium of backswamp deposits. The B horizon of the Wabash soil is usually gleyed, and its color ranges from black to very dark gray.

The classification of soils on the T-2 terraces is problematic. According to Dickey and others (1977:65), the Gymer soils formed in "old alluvial sediment" on high terraces (Buck Creek) along the Wakarusa River in Douglas County. However, Abmeyer and Campbell (1970) noted that the Gymer series is formed in loess within Shawnee County. In addition, the present study determined that soils on high T-2 terraces in the Wakarusa valley have also been mapped as Wabash, Reading, Martin, Vinland, and Ladysmith soils. The Wabash and Reading soils generally occur on T-1 surfaces, and the Martin and Vinland soils formed in residuum from bedrock. The Ladysmith formed in loess or old alluvium. Thus, the distribution of soil series does not correlate well with remnants of T-2 terraces. Therefore, these terraces cannot be readily identified based on their soil/landform associations in the county soil surveys.

Regardless of the confusion over the classification of the

T-2 soils, it is apparent that they are products of a lengthy episode of pedogenesis. T-2 soils are moderately to strongly oxidized, and they have well-developed argillic (Bt) horizons with colors ranging from dark yellowish brown to yellowish red. Soil textures vary widely among T-2 soils because of the different facies among their parent materials. In some locations the subsoil is calcareous and contains hard calcium carbonate concretions. The physical evidence for strong soil development on T-2 surfaces is supported by a radiocarbon date of 15,350±390 determined on organic carbon from subsoil at 14SH101.

Along transects from the modern floodplain to the high T-2 surfaces, as one might expect, the major trend in soil development within the Wakarusa valley is one of increasingly strong soil development as a function of time. The older soils at successively higher positions in the landscape generally have redder colors and greater B horizon development than the younger ones. This developmental trend is interrupted at some locations by soils that apparently do not fit the pattern described. Colluvium and younger alluvium have accumulated on T-1 and T-2 surfaces, and soils that are out of phase with the terrace chronology have developed on these surfaces. In some instances recent alluvium has buried older soils resulting in bisequal soils or welded paleosols that mask expected trends in soil development along cross-valley transects. The Kennebec soil is an example of a young soil with an A/C profile that is occassionaly developed on T-1 surfaces where the principal soils have Bt or at least B horizons. The Kennebec soil occurring in newly deposited sediment is a recent addition to a chronosequence of soils that vary considerably in their development on the T-1 surfaces.

Alluvial Chronology

Little is known about the ages of alluvial deposits in the Wakarusa River basin. Most of the radiocarbon dates have been determined on materials recovered at shallow depths beneath terrace surfaces (Table 3.2). Nevertheless, the present study provides some new information about the age of alluvial landforms in the project area.

The oldest C^{14} date for the T-2 terrace is from 14SH101. A lens of organic-rich sediment 137 to 142 cm below the T-2 surface yielded a date of 15,350±390 years B.P. This is the first radiocarbon date determined on material from the fill of a high terrace in the Kansas River drainage system. In addition, a date of 1400±100 years B.P. was determined on charcoal recovered at a depth of 20-30 cm below the T-2 surface at 14SH101.

There are few radiocarbon dates from the T-1 terrace in the Wakarusa River basin. A soil sample recovered from the upper 15 cm of a buried A horizon at 14DO153 yielded a date of 2930±80 years B.P. The surface of the buried A horizon is only 76 cm

Table 3.2. Radiocarbon Dates from Alluvial Landforms in the Wakarusa River Basin.

Site No.	Laboratory Number	Radiocarbon Years B.P	Material Dated	Depth (cm bs)	Landform
14DO19	UGa-4705	1075±65	Charcoal	Feature 2*	T-1
14DO19	Beta-19873	970±60	Charcoal	Feature 2*	T-1
14DO32	UGa-4704	950±150	Charcoal	Feature 6*	T-2
14DO32	Beta-18611	1090±50	Charcoal	Feature 5*	T-2
14DO153	Tx-5670	2930±80	Soil	76-115	T-1
14SH101	Tx-5667	1400±100	Charcoal	20-30	T-2
14SH101	Tx-5668	15,350±390	Soil	137-142	T-2
14SH101	Tx-5669	1240±90	Soil	142-177	T-0b

* Depths of these features, excavated by the University of Kansas in 1966, were not recorded, however all were located just below plow zone, or about 20 cm bs (Johnson 1968; see chapter 6).

below the modern T-1 surface. Charcoal from depths just below the plow zone (ca. 20 cm) of the modern T-1 soil at 14DO19 yielded dates of 1075±65 and 970±60 years B.P. Based on the suite of dates from the T-1 terrace, its surface stabilized sometime between about 3000 and 1000 B.P. The radiocarbon evidence is supported by archaeological data that indicate only Plains Woodland or more recent materials on the T-1 surfaces.

Only one radiocarbon date has been determined on material from the T-0b fill in the Wakarusa River basin. A buried A horizon 142 cm below the T-0b surface at 14SH101 was dated at 1240±90 years B.P. The surface of the buried paleosol is about 60 cm above the contact between the T-0b alluvium and the underlying bedrock. Thus, the radiocarbon date indicates that most of the T-0b sediment at 14SH101 was deposited during the past 1200 years.

The absolute age of the T-0a alluvium is not known. However, the soil evidence suggests that these near-channel deposits represent accumulations of "post-settlement" alluvium. The channeled Kennebec soils on the T-0a surfaces are characterized by weakly developed A/C profiles and prominent stratification. Since depositional features are still preserved in the T-0a soils, it is unlikely that the deposits are more than 150 years old.

In summary, the available radiocarbon data indicate that the near-surface alluvium of the T-2 terrace is Wisconsinan (ca. 15,000 B.P.) in age. The age of the T-1 fill is not known, but radiocarbon dates and soil-stratigraphy indicate that the T-1 surface stabilized between ca. 3000 and 1000 B.P.

Accumulation of T-0b sediment was underway by at least ca. 1200 B.P. and is still occurring. T-0a alluvium has been accumulating since about 150 B.P.

Regional Correlation of Alluvial Surfaces

The paucity of radiocarbon dates from the project area makes it difficult to compare the alluvial record of the Wakarusa drainage system with those of other river systems in the eastern Great Plains. However, some comparisons can be made based on the soil-geomorphic evidence and the few radiocarbon dates from the Wakarusa River valley.

The terrace sequence (T-2, T-1, T-0b, T-0a) in the Wakarusa River valley closely resembles that in the Kansas River valley. The T-1 terrace appears to be equivalent to the Newman, the T-0b equivalent to the Holliday, and the T-0a equivalent to the modern floodplain of the Kansas River. However, without the benefit of a large number of radiocarbon dates from terrace deposits, the correlations proposed here are tentative.

The T-2 terrace in the Wakarusa River valley is at the same position in the landscape as the Buck Creek terrace in the Kansas River valley. Also, at the levels of the T-2 and Buck Creek surfaces, the pattern is one of soils that are highly oxidized, suggesting that the terrace surfaces are equivalent in age. The presence of Wisconsinan-age alluvium in the T-2 terrace of the Wakarusa River valley raises a question about the age of the Buck Creek terrace in the Kansas River valley. As noted earlier, Davis and Carlson (1952) considered the Buck Creek terrace to be Illinoian. In a recent study near Bonner Springs, Kansas, Geil (1985) reported a 600,000 year date for volcanic ash (Lava Creek B) that <u>may</u> be in Buck Creek alluvium. If the T-2 terrace and Buck Creek terrace are correlatives, then the chronology of the Buck Creek terrace needs revision.

The T-1 terraces of the Wakarusa River valley are mapped as Newman terraces in reports prepared by O'Conner (1960) and Johnson and Adkinson (1967). Radiocarbon dates determined on materials from the Newman deposits in the Kansas River valley and its major tributaries indicate the fill was deposited between ca. 10,500 and 3000 B.P. The surface of the Newman terrace became relatively stable by ca. 2000 B.P.

Although a complete record of T-1 aggradation is not known for the Wakarusa River valley, radiocarbon data and soil-geomorphic evidence indicate a shift from alluviation to landscape stability and soil formation at ca. 3000 B.P. This pattern of late Holocene landscape stability has also been documented in other river valleys of the eastern Great Plains. Some of this evidence is summarized below.

Indications for stream stability and soil formation between 2600 and 1600 B.P. have been documented at several locations in eastern Kansas. A buried paleosol in alluvial fill of the

lower Kansas River near Bonner Springs was dated at 2395±65 B.P. (Holien 1982). Schmits (1980) conducted a detailed archaeological and paleohydrological study of the Coffey site adjacent to the Big Blue River in northeastern Kansas. Charcoal from a buried soil near the top of channel fill (Unit IV) at Coffey yielded dates of 2320±60 and 2480±55 B.P. Kurmann (1985) reported a date of 1580±70 B.P. on soil humates from a buried paleosol exposed in fill of Elbo Creek near Manhatten, Kansas.

Artz (1984) recently investigated the alluvial chronology of the East Branch Walnut River in south-central Kansas. His findings suggest that valley-wide aggradation occurred on floodplains between about 4500 and 2000 B.P. By 2000 B.P., aggradation had slowed, permitting soil formation on what are now T-1 surfaces. At or soon after 2000 B.P., the East Branch Walnut River and its tributaries entrenched and valley-wide aggradation ceased. The modern floodplain began to aggrade around 1850 B.P.

In northeastern Oklahoma, a major soil-stratigraphic unit, the Copan paleosol, has been documented throughout the upper Verdigris River valley (Hall 1977a, 1977b; Reid and Artz 1984). Formation of this alluvial soil occurred between about 2000 and 1350 B.P.

In west-central Missouri, Lees and others (1982) conducted an archaeological and geomorphological investigation on the Osage River downstream from the Harry S. Truman Dam. They bracketed the fomration of a buried soil in T-1 fill between 3000 and 1500 B.P. In the same area, Haynes (1976) and Brakenridge (1980, 1981) studied the alluvial chronology of the Pomme de Terre River. According to Brakenridge (1981), the T-1 alluvium (Rodgers formation) accumulated between about 13,550 and 850 B.P. Stream entrenchment occurred in the Pomme de Terre valley sometime after 1680 B.P., and the T-0 sediment aggraded between about 850 and 150 B.P.

Radiocarbon dates show that sediment of the T-1 fill of the Little Blue River in northwestern Missouri accumulated between about 8000 and 2000 B.P. (Mandel 1985). The archaeological and soils evidence suggests that T-1 aggradation either slowed or ceased between about 3000 and 2000 B.P. (Kopsick 1981; Mandel 1985). Entrenchment occurred soon after 2000 B.P., and T-0 aggradation was underway by 1460 B.P. (Mandel 1985).

As noted earlier, only one radiocarbon date has been determined on material from the T-0b terrace in the Wakarusa River valley. A buried soil near the base of the T-0b fill at 14SH101 was dated at 1240±90 years. Although the T-0b terrace and Holliday terrace complex cannot be correlated strictly on the basis of one radiocarbon date, it is significant that the most recent period of soil formation recognized in buried soils within the main valley of the Kansas River is about 1200 B.P.,

ascertained from radiocarbon dates of soil humates at two different localities (Johnson and Martin 1986). The buried soils occur in the fill of the Holliday terrace at both locations. Furthermore, the T-0b and Holliday terraces are at the same position in the landscape, and the same soils occur on the surfaces of both terraces.

Although the record of late Holocene fluvial activity in the Wakarusa River basin is similar to the one in the Kansas River valley and to those determined for other stream systems in the eastern Great Plains, a region-wide pattern is not as apparent for the early and middle Holocene. More specifically, episodes of early and middle Holocene landscape stability, documented elsewhere in the form of buried alluvial soils, are absent from the Wakarusa fluvial record. In the Little Blue River valley of northwestern Missouri, Mandel (1985) bracketed geomorphic stabil-ity and soil formation between about 6660 and 4000 B.P. Johnson and Martin (1987) noted that the paleosol record from the Kansas River system indicates at least four early through mid-Holocene episodes of landscape stability: 10,600 to 10,200, 8900 to 8300, 7250, and 5100 to 5000 B.P. Bettis and Hoyer (1986) reported that, between 6500 and 6000 B.P., sedimentation in the main valley of the upper Des Moines River slowed and soils began to develop on the early mid-Holocene floodplain. May (1985) obtained radiocarbon dates of 8780, 8160, 7750, and 7110 B.P. from buried soils in fill from the South Loup River valley in central Nebraska.

There are several explanations for the lack of early and mid-Holocene paleosols in terrace fills within the Wakarusa River valley. It is possible that there were no major episodes of landscape stability in the valley during that period. As Schumm (1976) noted, the timing of specific episodes of landscape stability may not have been the same in all portions of a drainage system because of internal controls and balances in the fluvial system. It is also possible that earlier paleosols were stripped away by floods and/or removed by lateral stream migration. Nanson (1986) noted that high flows associated with major floods may exceed erosional thresholds, and wholesale scour of channel boundaries and floodplain occurs. An additional possibility is that early and middle Holocene paleosols are present in fills but were not discovered. The history of landscape evolution stored in alluvium is fragmentary; not all fluvial events are preserved at one location or, necessarily, among a number of locations (Gladfelter 1985).

Hillslopes

The entire hillslope landscape of the project area can be subdivided into various hillslope elements. For the purpose of this discussion only these elements making up the ridgetops and hillsides are considered. Several models of hillslope development have been formulated. The model outlined by Ruhe and Walker (1968) is applicable to upland landscapes of the Wakarusa River valley.

In their model, Ruhe and Walker (1968) divided a hillslope into profile elements and geomorphic components where the intensity of erosion vs. deposition varies in a systematic fashion. The profile of a hillslope descending from the level upland to the base of the slope successively crosses: summit, shoulder, backslope, footslope, and toeslope. These hillslope elements are outlined diagramatically in Figure 3.2. The summit is the most stable area, the shoulder and backslope are zones of net erosion, while the footslope and toeslope are depositional areas.

The potential for buried archaeological sites in upland settings is dependent upon position in the landscape. On summits, various amounts of wind-born aerosols (dust), in conjunction with bioturbation, littering, freeze-thaw, and shrink-swell phenomena may have acted to bury prehistoric cultural materials (Wood and Johnson 1978). Based on the results of the present study, most of the cultural material buried in summit positions will be found at or above the boundary between the A (or BA) and B horizons of soils.

On the shoulders and backslopes, cultural materials will be at or near the land surface. These are areas of net erosion and therefore deep burial is precluded. Often these hillslopes exhibit outcrops of shale and limestone.

The most likely locations for the burial of prehistoric cultural materials along a slope profile are in the footslope and toeslope postions. Colluvial deposits often occur at or near the base of hillslopes. The colluvium is generally composed of a mixed matrix of silty clay and bedrock fragments. Archaeological sites may be deeply buried in the colluvial deposits and, therefore, cannot be detected by surface surveys or shallow testing.

The major problem with developing maps and/or detailed models of the hillslope elements in the project area is the small scale of most individual elements and the variation of erosion and deposition processes across them. Phenomena such as tree fall, rilling, and slumping may affect relatively small areas at a given time, but can have a severe impact on the integrity of an archaeological site (Bettis and Hoyer 1986). Because of these limitations, no detailed model of slope development at a scale useful for cultural resource surveys can be presented at this time.

Summary

The previous discussion has outlined, in general terms, the nature of the valley landscape in the project area and, in more specific terms, the characteristics of various landform/sediment assemblages. Available data indicate the project area includes a series of landscape elements ranging from Wisconsinan to very late Holocene in age. The findings and interpre-

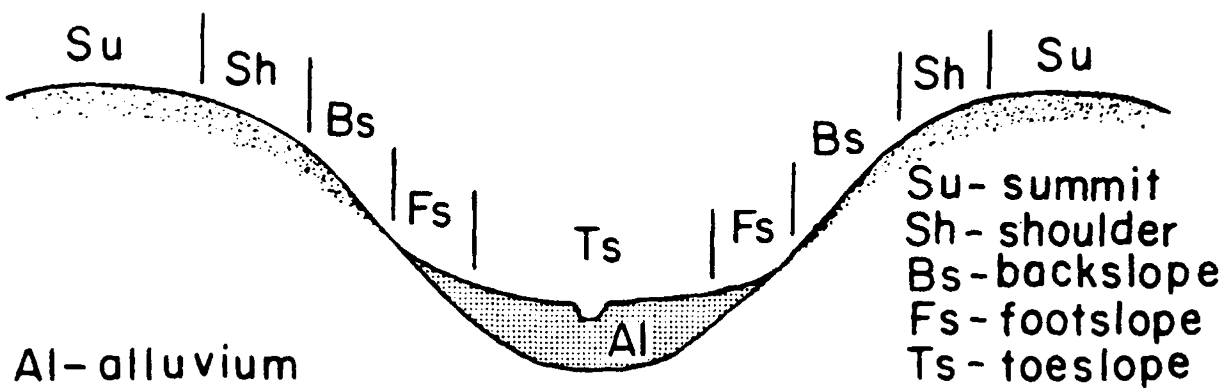


Figure 3.2 Generalized representation of hillslope topography.

tations of the geomorphic record of the Wakarusa River valley are briefly summarized.

This study determined that there are at least two alluvial terraces in the stream valleys of the Wakarusa basin. They are, in order of decreasing elevation and age, T-2 and T-1. Two floodplain surfaces, T-0a and T-0b, were identified at elevations lower than the T-1 terrace. The T-0a is the lowest and youngest surface exposed in the valleys. The age of the T-1 fill is not known. However, radiocarbon data and soil-geomorphic evidence indicate that the T-1 surfaces were stabilizing around 3000 B.P. The upper 1.5 m of the T-1 fill exhibits several buried surfaces and may contain evidence of late Archaic and later cultural periods. The T-0b terrace apparently accumulated during the late Holocene. At one location, a buried paleosol near the base of the T-0 fill was dated at ca. 1250 B.P. Thus, the buried paleosol and the alluvium above it may contain evidence of Plains Woodland and later cultural periods. The T-0a alluvium appears to have been deposited during the past 150 years and will not contain _in situ_ prehistoric sites.

The geomorphological data presented in this study provide a better understanding of late Quaternary landscape evolution in the Wakarusa River valley. However, additional information is needed in order to reconstruct the alluvial record. More specifically, emphasis should be placed on finding sites that may yield organic carbon suitable for radiometric dating. At present, little is known about the _absolute_ chronology of landforms and landscape evolution in the project area. Radiocarbon data would greatly facilitate the development of a landscape model for the Wakarusa River valley. This model could, in turn, be used to better assess the potential for buried cultural resources in the project area.

Chapter 4

REGIONAL CULTURE HISTORICAL BACKGROUND

Brad Logan

Introduction

The following outline of the culture history of the study area includes brief descriptions of culture-temporal diagnostic artifacts, features, and structures. However, the emphasis is on changes in settlement and subsistence practices as these reflect the dynamic interrelationship between human groups and their physical environment. It is apparent that human societies have occupied northeastern Kansas for at least the past 12,000 years, that significant changes in the physical environment of that region have occurred during that time, and that these societies successfully responded to such changes through that most flexible means of adaptation, culture.

Paleoindian (ca. 12,000 to 10,000 B.P.)

The earliest evidence of humans in northeastern Kansas coincides with the late Wisconsin glaciation some 12,000 years ago. At that time, the Great Plains was populated with small, nomadic bands of hunter-gatherers that were dependent primarily on such now extinct large animals as mammoth (*Mammuthus jeffersoni*) and bison (*Bison antiquus*). Paleoindian sites with associations of skeletal remains of these animals and the tools used to dispatch and butcher them, such as those found in the High Plains (Frison 1978; Haynes 1964, 1969, 1970; Rogers and Martin 1984; Wormington 1979), have not been discovered in the project area. However, there is evidence in the form of temporally diagnostic projectile points that these big-game hunters were in the project area and its vicinity.

Chambers and others (1977:126-128) describe the base of a fluted point (Clovis?) from 14DO137. This site is located on the interfluve of Dry Branch Creek and Deer Creek in the Wakarusa River basin. It is one of the sites that was investigated during the Clinton Lake Archaeological Project (see chapter 6). Projectile points indicative of Paleoindian activities occur throughout the state (Brown and Logan 1987). In northeastern Kansas, isolated finds of Paleoindian points (Clovis, Folsom, or Plano types) have been recorded in the Kansas River valley (Rogers and Martin 1982, 1983), near Highland in Doniphan County (Wedel 1959:176-179), in Tuttle Creek Lake near Manhatten (Solecki 1953; Schmits 1978), in the Delaware River basin (Witty 1964), on Plum Creek near Kickapoo (Logan 1981a), and in the Little Walnut Creek drainage in Atchison County (Logan n.d.). Unfortunately, none of these finds was recorded in an undisturbed archaeological context and they therefore provide little information about the cultural adaptations of the Paleoindian inhabitants of that region.

Archaic (ca. 10,000 to 2,500 B.P.)

With the demise of the late Pleistocene megafauna some 10,000 years ago, the hunters of the Great Plains shifted to the hunting of modern game such as deer, elk, and bison (*Bison bison*) and a greater dependence on wild plant foods. Cleland (1976) has described the Paleoindian to Archaic subsistence shift as a change from a focal economy to one more accurately described as diffuse. Archaic settlement sites indicate a shift toward seasonal exploitation of resources in local micro-environments and, in the lower Missouri and Kansas River region, at least by the Late Archaic period, the establishment of an annual round focused on forest-riverine and upland prairie resources.

Evidence of a transitional Paleoindian to Archaic culture complex known as Dalton (10,000 to 9,000 B.P) has been found in northeastern Kansas and northwestern Missouri. The center of this complex is in the southeastern part of the United States and the study area lies on its northwestern periphery (Chapman 1975). Sites in the Dalton core area reflect a woodland-riverine adaptation with hunting of deer and raccoon and harvesting of hickory nuts and black walnuts forming the mainstays of the subsistence pattern (McMillan 1976; Logan 1952; Morse 1973; Morse and Goodyear 1973). Distinctive Dalton bifacial stone tools have been found in northwestern Missouri (Jolly and Weeks 1978; Logan 1979) and the Central Plains (Myers and Lambert 1983). In the latter region these artifacts are referred to as Meserve points, which Myers and Lambert (1983) suggest are clinal variants of the Dalton point. Dalton points have been noted in private collections from Leavenworth and Atchison counties in northeastern Kansas (Logan 1981a, 1987, n.d.)

Other information on Early Archaic inhabitants of northeastern Kansas comes from the Sutter site (14JN309) on Muddy Creek in Jackson County. Evidence from this site, buried by some 30 ft of deposits, resulted in recovery of lanceolate and square-stemmed projectile points and other tools comparable to the Frederick and McKean complexes of the High Plains (Katz 1971). Radiocarbon dates from the site cluster between 7,500 and 8,000 B.P. (Katz 1972). The deep burial of cultural material at the Sutter site suggests other Early Archaic sites in alluvial settings in northeastern Kansas may occur in similar geomorphic contexts.

The Middle Archaic period (ca. 7,000 to 5,000 B.P.) coincides with the Hypsithermal (King 1980) or Atlantic (Bryson *et al.* 1970) climatic episode. In northeastern Kansas, this episode of maximum post-glacial aridity brought about an expansion of prairie and a corresponding recession of the upland and/or riverine woodlands (Gruger 1973). Perhaps as a response to this environmental change, Archaic hunter-gatherers adopted an economic strategy based on the use of a wide variety of plant

and animal resources available in aquatic, floodplain forest, and floodplain prairie communities. Evidence of the practice of this diffuse economy has been found at the Coffey site (14PO1), in the Big Blue River basin north of Manhatten, Kansas (Schmits 1978). This site was occupied during the late Hypsithermal, a time of initial woodland re-expansion about 5,055 to 5,270 B.P. (Schmits 1978:85). At the time of its occupation, the site was near the margin of an ox-bow lake. Artifacts recovered include lanceolate bifaces, basal-notched and corner-notched projectile points, gouges, axes, groundstone manos, and metates.

The trend toward increasing sophistication in the use of forest-riverine resources in the lower Kansas and Missouri River region continued during the Late Archaic period (ca. 5,000 to 2,500 B.P.). In northwestern Missouri and northeastern Kansas, this period is represented by the Nebo Hill phase. Sites of this complex include the Nebo Hill type site (23CL11), on a bluff-top overlook of the Missouri River in Clay County, Missouri (Reid 1980a, 1984); the Sohn site (23JA110), a camp site on a terrace along the Little Blue River (Reeder 1978, 1980); the extensive upland sites of Turner-Casey (23JA35) and 23JA170, also in the Little Blue River drainage (Brown 1977; Schmits 1981); and the Doherty site (14MM27), a camp site on a terrace in the upper Marais des Cygnes basin in Miami County, Kansas (Blakeslee and Rohn 1982). Artifacts indicative of the Nebo Hill phase have also been recovered from sites in Leavenworth County (Logan 1981a, 1987) and Atchison County (Logan n.d.), Kansas.

The Nebo Hill complex is characterized by a variety of chipped stone and groundstone tools and the earliest known pottery (fiber-tempered) in the region (Reid 1984). The most distinctive artifacts of the lithic assemblage are finely retouched, lanceolate bifaces that served as dart points and cutting tools (Shippee 1948, 1957). Side-notched and corner-notched dart points also occur as a minor element of the assemblage. The Nebo Hill folk practiced a seasonally-determined settlement pattern with late summer through fall occupation of bluff tops by aggregates of bands that utilized the resources of the nearby upland forest and prairie communities, as well as the floodplain and aquatic zones. Primary subsistence was based on deer and black walnuts. During winter months the groups apparently dispersed into small, lowland camps (Reid 1980a).

Woodland (Early Ceramic; ca. 2500 to 1000 B.P.)

The Early Woodland period (ca. 2500 to 2000 B.P.) is not known in northeastern Kansas and has only recently been recognized in northwestern Missouri. At present, only three sites of this period are known and all are in the Little Blue River valley. These include the Traff site (23JA159, Wright 1980), 23JA36, and 23JA40 (Brown and Zeigler 1981). Assignment of these sites to the Early Woodland period is based on the pre-

sence of Morton complex ceramics and/or radiocarbon dates. Sites of this period are not found in the project area.

The Middle Woodland period in the lower Kansas River basin is represented by the Kansas City Hopewell complex (ca. 2000 to 1200 B.P.; Wedel 1943, 1959; Shippee 1967a). The Kansas City Hopewell culture differed in several dramatic respects from its Late Archaic and Early Woodland predecessors in the area. The Hopewellian folk were so proficient in utilizing the resources of the oak-hickory forest community that they were able to occupy village settlements on a permanent basis. These villages are generally situated near the mouths of tributaries to the Missouri River.

Two examples of village sites, both in Platte County, Missouri, are the Renner site (23PL1), located near the mouth of Line Creek, and the Young site (23PL4), situated near the mouth of Brush Creek. Smaller, short-term camps, probably ancillary to the village, are located in the vicinity of these sites (Johnson 1976). Other major sites of this complex include the Aker site (23PL43), a village site on the Missouri River floodplain east of Leavenworth, Kansas; the Kelley site (14DP11, Katz 1969), a small camp on Squaw Creek in Doniphan County, Kansas; the Trowbridge site (14WY1, Bell 1976), a major village in the interfluve region near the confluence of the Kansas and Missouri Rivers; and the Perry site (14JF314), a village site on a remnant of the Newman Terrace in the Kansas River valley south of Perry, Kansas. The proximity of the last site to the project area suggests some evidence of the Kansas City Hopewell complex could be expected in the project area (cf. Logan 1981a, 1985). However, no such evidence has yet been recorded and none was discovered during the Clinton Lake Archaeological Project.

Artifacts diagnostic of Kansas City Hopewell include large, ceramic jars tempered with sand, grit, sherd, or a combination of these materials (Katz 1974). Exterior surfaces are plain, and rims and shoulders are decorated with a variety of designs, including cross-hatched incisions, rocker-stamped marks, hemiconoid punctates, or lip notches (Wedel 1943, Shippee 1967a; Chapman 1980). These designs varied through time and have been arranged in a chronological seriation (Johnson and Johnson 1975). Lithic artifacts include corner-notched and contracting-stemmed dart points, blocky end scrapers, drills, gouges, chipped-stone and groundstone celts and axes, and utilized bladelets. Faunal remains, such as turkey bones and deer metapodials and antlers, were also modified for use as awls, punches, beamers, and flaking tools. Sedentary occupation of village sites is suggested by the presence of trash-filled storage pits and thick midden deposits. Stone-lined, earth-covered burial mounds located on bluff tops near some of the larger settlements are another salient feature of this complex (Wedel 1943; Larsen and O'Brien 1973; Tjaden 1974).

Although the center of the Kansas City Hopewell culture

was near the confluence of the Missouri and Kansas Rivers, sites with such a Middle Woodland affiliation occur throughout northeastern Kansas. The occurrence of Hopewellian traits in more traditional Plains Woodland assemblages, as well as the spatial and temporal overlap of these complexes, suggest that the Kansas City Hopewell folk influenced the development of later Woodland groups in this region (Johnson 1983). Two expressions of the Plains Woodland pattern that was established by 1300 to 1200 years ago are recognized in the project area or its immediate vicinity. These are the Grasshopper Falls phase, centered in the Delaware River drainage, and the Wakarusa phase, which occurred in the project area. A third, tentatively identified phase, the Deer Creek phase, has also been suggested for the project area.

The Grasshopper Falls phase is defined from three excavated sites, the Malm (14JF307), Anderson (14JF331), and Teaford (14JF333) sites in the Perry Lake area of the Delaware River (Reynolds 1979). This phase is characterized by small settlements located on terraces along or near secondary streams. Evidence of house structures at the excavated sites occur in the form of postmolds that outline what are inferred to have been oval-shaped, grass and daub covered lodges. Temporary occupancy is suggested by sparse amounts of daub and lack of interior hearths (Reynolds 1979:104). The material culture of the Grasshopper Falls phase groups included medium to large pottery vessels in the form of wide-mouthed, conical-based jars. The exterior surfaces of these vessels are cord-marked, partially smoothed-over, smoothed-over, or brushed. Temper consists of dense amounts of angular grit and rim decoration of any sort is rare.

Lithic artifacts of the Grasshopper Falls phase are similar to those of the Kansas City Hopewell, but with the significant addition of the corner-notched arrow point, a trait that first appeared in the region late in the Middle Woodland period. Settlement sites consisted of a small number of structures, each large enough for a nuclear family. Subsistence was apparently based on hunting and gathering, although floral and faunal evidence of those practices was sparse at the excavated sites. No direct evidence of the practice of horticulture has yet been found. Mortuary practices are presently unknown. Either a long duration of occupancy or a large population in the Delaware basin is indicated by the presence of at least 120 recorded site components of this phase (Reynolds 1979:103).

The Wakarusa phase was defined on the basis of one excavated settlement, the Kampschroeder site (14DO27), which was on a terrace in Rock Creek valley prior to its inundation by Clinton Lake (Johnson 1968). Although structural evidence was poorly defined at this site, the presence of a few postmolds and quantities of daub were indicative of a permanent shelter of pole framework and wattle-and-daub construction. In contrast to the Grasshopper Falls phase settlements, the structure at the Kampshroeder site included a central, basin-shaped

hearth. Whereas storage facilities at the former settlements were located both inside and outside the lodges, only interior storage pits were defined at the Wakarusa phase settlement. Ceramic vessels at the Kampshroeder site consisted of elongate jars with slightly out-curved, undecorated rims and rounded lips. Exterior surfaces are cordmarked or partially smoothed over. Temper consists of abundant grit and sand. Lithic artifacts are comparable to those of the Grasshopper Falls phase, although the small, corner-notched arrow points frequent at the latter were not included in the small sample of projectile points found at 14DO27.

The third, tentatively identified phase of the Plains Woodland period in the project area is the Deer Creek phase (Johnson 1968:132-133), recognized from excavations at the Anderson site (14DO32), and other surface collections from sites in the project area. The Anderson site was one of those tested during the Clinton Lake Archaeological Project. The characteristic that most distinguishes this phase from the Wakarusa phase is the presence of small, corner-notched arrow points in the lithic assemblage. This addition suggests that Deer Creek post-dates the Wakarusa phase.

The temporal limits of the Plains Woodland phases in northeastern Kansas are, as yet, poorly defined. No radiometric dates were forthcoming from the only excavated site of the Wakarusa phase and, until the Clinton Lake Archaeological Project, none had been determined for the Deer Creek phase. Investigations at 14SH101, tentatively assigned to the Deer Creek phase (chapter 6), resulted in the first radiometric determinations for this complex. Only two radiocarbon dates from as many sites provide any such information for the Grasshopper Falls phase. A date of A.D. 760±90 comes from the Anderson site (Reynolds 1979:50) and another of A.D. 600±60 has been provided recently from the Grasshopper Falls phase component at 14AT2 (Williams 1986). General placement between 1500 and 1000 years ago for Plains Woodland phases in eastern Kansas has been suggested (Johnson 1984).

Plains Village (Middle Ceramic; ca. 1000 to 500 B.P.)

Cultures of this period are distinguished from those of the Woodland period not only by distinctive lithic and ceramic assemblages but by evidence of an increasing reliance on domestic plant foods, including corn, beans, squash, and sunflowers. Although the degree of reliance on cultigens has not yet been satisfactorily quantified, it is believed to have been significant (Wedel 1959:627; Adair 1984). The practice of small scale horticulture in combination with a continued dependence on hunting and gathering led to a more sedentary lifestyle than that of the Plains Woodland groups.

Complexes of this period that figured in the culture history of northeastern Kansas include the Steed-Kisker phase of northwestern Missouri, the Nebraska phase of the Missouri

River valley from extreme northeastern Kansas northward along the Nebraska-Iowa border, and the Pomona variant of eastern Kansas and northwestern Missouri. Although it is known that other cultures, such as the Smoky Hill and Upper Republican complexes of the Central Plains Tradition, interacted with these contemporary groups in other areas (e.g., Steinacher 1976), no evidence of this interaction has yet been discovered in the project area.

The Steed-Kisker phase was first recognized in the Platte River valley in northwestern Missouri (Wedel 1943). It is currently known from several settlement and burial sites in the Kansas City locality (Calabrese 1969; Shippee 1972; Chapman 1980:156-160; O'Brien 1978a, 1978b, McHugh 1980). This phase has been dated from about 1000 to 750 years ago. Certain ceramic traits show some similarity to the Middle Mississippian cultures of eastern Missouri and western Illinois. Some consider the complex a result of a migration of peoples from those areas (Chapman 1980:156) and others consider the Mississippian traits to be little more than a veneer over a typical Central Plains Tradition manifestation that developed locally (Henning 1967). Settlements of this complex consist of remains of one or two shallow pit house of subrectangular outline. These occur primarily on terraces along tributary streams of the Missouri, Platte, and Little Platte Rivers. Sedentism is indicated by trash-filled storage pits and the presence of extensive burial grounds near some settlements. Hunting, gathering, and horticulture are reflected in the lithic tools, and faunal and floral remains.

Cermaic artifacts of the Steed-Kisker phase include shell-tempered bowls and jars with plain surfaces, a variety of incised lines or scroll designs, and appendages such as lugs or loop handles. Other artifacts include clay pipes, animal and human effigies, small triangular, side-notched and side-and-basal-notched arrow points, small end scrapers, alternately beveled knives, groundstone celts and axes, sandstone shaft abraders, groundstone pipes, and worked hematite. Burials include extended, flexed, and bundle skeletal remains and associated grave goods, such as bowls and arrow points.

The Steed-Kisker phase has been suggested to have been ancestral to the Nebraska phrase (Calabrese 1969). However, in the light of the fact that both complexes occurred at roughly the same time in their respective areas, it is difficult to accept such a hypothesis. In northeastern Kansas, the most southward known extent of Nebraska phase settlements is in present Doniphan County. Examples include the Nuzum site (14DP10, Wood 1969) and 14DP13 (Heavin 1970). Radiocarbon dates for the Nebraska phase range from about 900 to 525 years ago (Blakeslee and Caldwell 1979:19-20).

The settlement-subsistence pattern of the Nebraska folk is identical to that of the Steed-Kisker phase. Both occupied small hamlets of subrectangular pit houses that contained cache

pits. The Nebraska phase folk also depended on hunting, gathering and horticulture. The presence of such artifacts as bison scapula hoes and deer mandible sickles in Nebraska phase assemblages is generally believed to indicate some dependence on domestic plant foods. Wood (1969:102-104) has interpreted the evidence from the Nuzum site as suggestive of sedentism, which resulted from the combined exploitation of the wide variety of wild plant and animal foods available in their ecotone habitat and cultivation of domesticated plants. In particular, he contrasts the solitary pursuit of wild game by Nebraska hunters with the long-range migration of Upper Republican villagers in pursuit of bison in the mixed grass prairie.

Ceramics of the Nebraska phase include both shell-tempered and grit-tempered bowls and jars with lug and strap handles and rim-incised designs. Direct rims predominate but decorated, collared rims also occur. The presence of collared rims is perhaps the most distinguishing characteristic between the ceramic assemblage of this phase and that of the Steed-Kisker phase. Lithic artifacts include a variety of corner-notched and side-notched dart and arrow points, knives, drills, small scrapers, celts, hoes, grooved mauls, and sandstone abraders. In this regard, the Nebraska phase is similar to the Steed-Kisker complex and other complexes of the Central Plains Tradition.

The fact that artifacts indicative of both the Steed-Kisker and Nebraska phases have been found in Stranger Creek basin, a north-bank tributary of the Kansas River located just northeast of the Wakarusa River valley, suggests similar evidence of these complexes may also be found in the project area (Logan 1981a, 1983, 1985). However, with the exception of a collared rim sherd discovered at 14DO157 (Nathan 1980:148, 150) that might indicate the presence of Nebraska (or Upper Republican?) folk in the study area or, perhaps, interaction with contemporaneous Pomona peoples in the study area, no conclusive evidence has been discovered.

The Pomona variant was first defined as a focus (Witty 1967) but has recently been redefined as a variant with four recognized phases (Brown 1985). Core areas of all phases of the Pomona variant, as far as they are currently known, were limited spatially to eastern Kansas, although it has been suggested that western Missouri served as a resource area at certain times of the year for some phases. Two phases occurred in the Wakarusa River drainage, the Clinton phase and the Maybrook phase (Brown 1985).

The Clinton phase (ca. 1040 to 570 B.P.) was originally defined by Johnson (1968) on the basis of the excavation of the Anderson site (14DO32) and the Hatcher site (14DO19), two sites also investigated during the Clinton Lake Archaeological Project. The initial assignment of the Clinton phase to the Central Plains Tradition has been revised in the light of the fact that the Pomona variant, of which these sites are repre-

sentative, lacks the sub-rectangular earth lodge and interior hearths characteristic of that tradition (Witty 1978). The Pomona variant house form is oval and, although interior hearths are lacking, interior cache pits do occur. Brown (1985) has redefined the Clinton phase on the basis of data from the Hatcher site. Artifacts indicative of the Clinton phase are arrow points made of non-local cherts and ceramic vessels with undecorated lips.

The May Brook phase (ca. 850 to 700 B.P.) is represented by the Seven Acres site (23JA115), May Brook site (23JA43), and Black Belly site (23JA238) in the Little Blue River valley, Missouri (Brown and Ziegler 1981; Schmits 1982). Sites of this phase have been identified in the Wakarusa, Neosho, Marais des Cygnes, Little Blue, Bull Creek, and Verdigris River drainages, as well as the Truman Lake area in Missouri (Brown 1985). This phase is characterized by use of arrow points made of non-local cherts and ceramic vessels with shell temper and decorated lips. The Anderson site, which was investigated during the Clinton Lake Archaeological Project, has been assigned to this phase (Brown 1985:445).

A third phase, the Apple Valley phase (ca. 700 to 650 B.P.), is centered in the Delaware River drainage north of the project area. However, Brown (1985) suggests the populations of that phase may have used the Wakarusa River basin as a resource area. This phase is characterized by arrow points made of local cherts and ceramics that include a high frequency of rim decoration, with knobbing being particularly diagnostic. Shell tempering of vessels always occurs to some extent in the ceramic assemblage.

Brown (1985) has suggested that the Pomona settlement pattern was a continuation of the preceding Plains Woodland and Late Archaic patterns in the same region. This was characterized by a shift between upland, warm weather settlements and lowland, cold weather sites. Our knowledge of the former sites has been hampered by the bias toward investigation of sites on terraces in valley settings. Seasonal abandonment of sites to pursue game in the mixed grass prairie to the west of the project area and in the Ozark Highland to the east (i.e., resource areas) has also been proposed as part of the Pomona settlement-subsistence pattern. Witty (1978) has suggested that the Pomona complex is a late Plains Woodland manifestation that was contemporaneous with Central Plains Tradition groups in eastern Kansas.

Protohistoric (Late Ceramic; ca. 550 to 300 B.P.)

The Indians encountered in northeastern Kansas by the first Euro-Americans were the Kansa. These people were also found east of the Mississippi River in 1673 and their arrival in the Kansas and Missouri River region probably post-dates that time. What people were occupying the historic Kansa domain just prior to their arrival is presently unknown. This

period is represented elsewhere in Kansas and Nebraska by sites of groups identified as protohistoric Wichita, Pawnee, and Plains Apache (Wedel 1936, 1959, 1979; Gunnerson 1960). In Missouri and Iowa, the Oneota culture has been tentatively linked to later historic Siouan groups (Henning 1970; Harvey 1979; Chapman 1980:236). In extreme southwestern Nebraska and northeastern Kansas however, the Oneota-like manifestations at the Leary, Fanning, and Doniphan sites neither represent a well-established presence in those areas nor do they provide any evidence of a protohistoric link to the Kansa (Hill and Wedel 1936; Wedel 1959:131-172). Wedel (1959:171) has suggested that the Fanning site can be tentatively identified as an early Kansa manifestation, given several eastern traits in the recovered assemblage, yet he also believes it was occupied just prior to A.D. 1700 and may be evidence that corroborates the identification of the Kansa in that area on the Delisle maps of 1703 and 1718. Thus, the greater part of this period in northeastern Kansas in general, and the project area in particular, remains unknown. The apparent abandonment of the region by both Pomona and Central Plains Tradition groups may yet be linked to changes in their physical and/or social environments.

Historic (ca. 300 B.P. to present)

The historic period in northeastern Kansas is represented by its occupation from the eighteenth to the mid-nineteenth centuries by the Kansa (Unrau 1971). Major Kansa village sites in the region include the Doniphan site (14DP2) and Fanning site in northeastern Kansas (Wedel 1959) and the King Hill site (23BN1), which is located in a residential section of St. Joseph, Missouri and is across the Missouri River from the Fanning site (Shippee 1967b; Henning 1970:146).

Kansa contact with Euro-Americans is demonstrated at these sites by the presence of trade goods, such as metal tools and glass beads. The Kansa, a Dheigha Siouan people, practiced a typical Plains Village lifeway, spending half of the year in their village subsisting on corn, beans, squash and other plant foods (Cutler and Blake 1982) and local game. The balance of the year was spent in pursuit of bison in the mixed grass prairie-plains region along the Smoky Hill and Solomon Rivers. Etienne Veniard de Bourgmount, a French trader, contacted the Kansa at their Doniphan site village in 1673 and accompanied them on such a bison-hunting excursion. His journey through northeastern Kansas is the earliest historical account of its environment and native inhabitants (Margry 1886).

Other groups contemporary with the Kansa, including the Missouri, Osage, and Pawnee, are known to have traversed the Kansas River basin during hunting forays (Barry 1972). Several eastern migrant groups of Indians, including the Delaware, Kickapoo, and Shawnee, occupied reservations in northeastern Kansas from 1830 to 1865. The Wakarusa River valley was the domain of the Black Bob band of the Shawnee (Callendar 1978; Foreman 1946). Prior to intensive Euro-American settlement

after the Civil War, the region was explored by French and French-Canadian traders and trappers (Hoffhaus 1964, 1984; Barry 1972). The Santa Fe trail was blazed across the southern divide of the Wakarusa River valley during later American military and commercial ventures (e.g., Abert 1848; Gregg 1954). The Wakarusa River valley played a role in the days of "Bleeding Kansas" that led to the Civil War (Andreas 1883). Historic sites in the project area are described in Johnson (1968), Chambers and others (1977), and Nathan (1980). Chambers and others (1977:16-43) provide an outline of the history of the Clinton Lake area from the Spanish Entrada in Kansas to the building of Clinton Dam.

Chapter 5

METHODS OF INVESTIGATION

Brad Logan

Methods employed during the Clinton Lake Archaeological Project followed a three-phase approach. Preliminary steps to site testing included a literature search and logisitical reconnaissance of the project area in May and June 1986. This was followed by submission of a research design (Logan 1986) and the implementation of field work procedures. Field work occurred from July to September 1986. Data analysis, the third phase of the project, occurred from November 1986 to May 1987. Details of each of these phases are provided below.

Preliminary Procedures

The first step in the investigation of the 27 selected sites in the Clinton Lake Project area was a thorough review of all literature pertaining to archaeological research in that area and in adjacent regions that contain a comparable cultural heritage. This entailed a review of reports, maps, field notes, and site survey files at the University of Kansas, Museum of Anthropology as well as theses, dissertations and published literature pertaining to the prehistory of the eastern portion of the Central Plains. In addition, the most recent set of aerial photographs of the project area, taken on July 23, 1983 when the flood pool elevation was 874.47 ft above mean sea level (amsl), was reviewed at the Clinton Lake Project Information Center in order to locate sites, determine the nature of their present environmental context, and determine the best means of approaching them for field investigation.

An attempt was made to visit each of the sites to be tested in order to outline the logistics of test excavation. This preliminary field work, undertaken as part of the formulation of the research design (Logan 1986), occurred when rains had raised the level of Clinton Lake to an elevation of 881.84 ft (May 19) and 881.95 ft (May 20), nearly six feet above normal flood pool. Some of the sites to be investigated could not be reached at that time because of swollen streams and impassable roads. Logistical ar-rangements were also made at that time with officials at the Clinton Lake Project, Kansas Fish and Game Commission, and Clinton State Park. These individuals were consulted concerning the location of sites, how they were best approached, and what farmer (if any) had leased land on which sites were located.

Field Investigations

Archaeological field methods varied somewhat for each of the sites tested during the project. However, certain techniques were standard for all sites. Each site was intensively

surveyed by the field crew in transects that generally were no more than three meters (10 ft) apart. All cultural material was marked with pin flags in order to determine the extent of the site. When vegetation limited artifact visibility, shovel tests were dug. These tests measured at least 30x30 cm and 30 cm in depth, sufficient to penetrate any zone of agricultural disturbance.

Once located, the site boundaries were then paced off, the area estimated in units of square meters, and an appropriate sample size of excavation units for the site calculated. The number of units was based on both the areal extent of the site and the abundance of cultural material. Units were placed in areas that contained greater densities of cultural material in the belief that these surface conditions reflected similarly high quantities of subsurface deposits. The quality, as well as the quantity, of artifacts on the surface was also taken into account when considering the placement of test units. For example, clusters of burned limestone might represent a hearth, a portion of which might yet remain undisturbed below the plow zone. Similarly, a concentration of daub on the surface might indicate a habitation that had been partially disturbed by plowing. Such clusters or concentrations were selected for testing.

Surface artifacts diagnostic of either a culture complex or a time period and formal tools that reflected specific activities, such as hunting, food processing, or social interaction, were not only pin-flagged but mapped with respect to a datum, or fixed point of reference. These artifacts were also collected and later cataloged with reference to their specific provenience.

A datum, consisting of a five foot long tube of white, PVC plastic, was placed at each site for mapping purposes. The locations of all diagnostic surface artifacts, test units, and backhoe trenches were mapped with respect to this datum. Similarly, each site was mapped topographically from such a reference point with a laser transit. Distances and elevations measured at the tested sites with this instrument are accurate to within one-tenth of a centimeter. Each datum is intended to be permanent and useful for future investigations by other professional archaeologists. Thus, each datum was buried to at least one-half its height in a hole excavated with a mechanical, two-person auger and in a place considered to be safe from agricultural practices yet easily found by future investigators.

Excavation units were $1m^2$, although two such squares were sometimes contiguous, forming 2x1m units. After careful excavation and screening of the plow zone, these units were excavated in 10 cm levels. In some cases where plowing was not apparent, units were entirely excavated in 10 cm levels. Test units were dug to depths sufficient to determine the vertical extent of cultural deposits. At sites where deeply buried cultural remains might exist, short trenches (generally three

meters long) were excavated with a backhoe. Trenches varied in depth, depending on the nature of the deposits (i.e., alluvial or residual) but those excavated in alluvium were at least two meters deep. All test units and trenches were inspected not only by an archaeologist but also by the project geomorphologist, who recorded the nature of all soils and sediments.

Units were excavated manually with shovels, trowels, picks, small "dental" tools, and brushes. Fill from all units was screened through one-quarter inch mesh hardware cloth. All cultural material was stored in either paper bags or tin canisters (the latter were used for radiometrically datable samples). All such containers were marked with the site number, unit number, level number and depth below surface, date of excavation, names of excavators, and any other pertinent information. Soil samples were collected at units where cultural materials smaller than the size of the screens were thought to occur. These samples were then processed by water flotation to recover small pieces of lithic, ceramic, and biotic material. These samples were also collected for possible pollen and opal phytolith analysis. All measurements were taken in the metric system.

When recognized features were encountered they were excavated separately from their surrounding soil or sediment matrix. The fill from one feature (Feature 1) at 14SH101 was bagged in its entirety and subjected to water flotation. Flotation results in disaggregation of the soil matrix and separation of the residual materials into light and heavy fractions. The latter contains lithic and ceramic materials and the former includes microfloral and microfaunal remains.

Each unit was excavated by a team of at least two persons. Field notes, including level forms, feature forms, and profiles, were composed by each team. The Principal Investigator and Field Director kept a daily journal noting all personnel in the field, units begun or completed, significant finds or lack of same, condition of each site at the time of investigation, etc. Photographs, including color slide and black-and-white exposures, were taken of test units, features, and the progress of all phases of the fieldwork and a photo-log was maintained.

The size of the field crew varied from day to day, ranging from a high of nine persons to a low of four. However, the average crew consisted of the Principal Investigator, Field Director, and five excavators. Fieldwork commenced on July 1 and test excavations were completed on September 6, 1986. Backhoe work was conducted in January 1987 in order to prevent damage to crops.

Laboratory Analysis

All recovered materials were transported to the University of Kansas, Museum of Anthropology to be washed, sorted, cataloged, and analyzed. Each artifact was assigned a unique

catalog number and, if possible, the number was written on the artifact. In all cases, artifacts were placed in vials or zip-lock plastic bags together with a card containing the catalog number (which incorporates the site number), unit and level provenience, type of artifact, and other pertinent information. The same information is also recorded in a set of record books designated for the Clinton Lake Archaeological Project. These materials will be permanently curated at the University of Kansas, Museum of Anthropology, which also houses all other professionally recovered collections from sites in the project area. It is the policy of the Museum of Anthropology to enter all of its collections into a computer-based data retrieval system. It is anticipated that the material recovered by Kaw Valley Engineering will also undergo this process.

Following the cataloging process, recovered materials were subjected to assemblage analyses. The collection was divided into the following categories for this process: lithics, ceramics, floral remains, faunal remains, and historic materials. Historic artifacts comprise a very small percentage of the assemblages from 17 of the investigated sites. Only at 14DO40 were more than a few artifacts from the historic period found and those all derived from a 2x1 meter test unit (Units 2 and 3) in an area of the site where a farmstead was located as recently as 1955. The U.S.G.S 7 1/2' Clinton, Kansas quadrangle topographic map of that date (photorevised 1983) shows the farmstead buildings. They were probably razed when the land was purchased by the U.S. Army Corps of Engineers. Since historic materials do not constitute a meaningful portion of the assemblages from sites tested during the project, the historic components they represent cannot be considered of any significance in the evaluation of the sites for the National Register of Historic Places. For this reason, historic assemblages are not discussed in detail in the main body of this report but are described in Appendix 1.

Details on the analysis procedures for each of the prehistoric lithic, ceramic, and biological assemblages are provided in the sections devoted to each in this report. However, some general staterents about the treatment of these assemblages can be provided here.

Lithic artifacts include all chipped-stone and groundstone items including formal and informal tools, cores, and debitage. Formal tools are those which resulted when a raw material blank, such as a flake, was modified to a finished shape that reflected some preconceived template on the part of the manufacturer. Examples are projectile points, scrapers, drills, knives, axes, gravers, and celts. Informal tools are those which result when the blank was not extensively modified prior to use. Rather, the only recognizable modification to the blank is attributable to its use in some task, such as scraping wood or hide. Examples of informal tools are notches, denticulates, and utilized flakes or chips. More detailed definitions of lithic artifact types are provided in chapter 7.

Ceramic artifacts often provide the most reliable means of identifying the cultural affiliation of the site with which they were associated. Since clay is a plastic medium, shaping it can result in an endless variety of forms. These forms, however, are dictated by cultural norms, including concepts of aesthetics and what constitutes a useful object (e.g., a pottery vessel used for cooking or storage). The combination of a plastic medium and aspects of form and style make ceramic materials ideal temporal indicators. The emphasis in the analysis of the ceramic assemblage from the tested sites in the Clinton Lake area is on their utility for identifying the time of site occupation and the cultural affiliation of the site's occupants. Those attributes deemed most characteristic of certain culture complexes are de-fined and identified in chapter 8.

Biological remains from archaeological sites are valuable to the degree that they provide information on the environment of a site, the subsistence practices of its inhabitants, the season of their occupation, or the physiology of the inhabitants themselves. Human remains may provide information about the physical make-up of past populations. Moreover, if found in the right context, human remains can also tell us something about the mortuary practices of past peoples and their supernatural beliefs. These aspects of the biological assemblages from the Clinton Lake project are explored in chapter 9. Details concerning the methods of analysis for each category, including floral, pollen, opal phytolith, faunal and human remains, will be found in the appropriate section of that chapter.

One other form of specialized analysis was applied during the Clinton Lake Archaeological Project. This is radiocarbon dating, a form of absolute dating that provides the best means of determining the time of occupation of a site. Two laboratories, Beta Analytic of Coral Gables, Florida and the Radiocarbon Laboratory at the University of Texas, were employed for radiocarbon dating. These institutions provided a total of eight dates on samples recovered from four sites (14DO19, 14DO32, 14DO153, and 14SH101). Four additional dates supplied to previous investigators by the Radioisotope Laboratory at the University of Georgia have also been incorporated in this report. These dates are on samples recovered from 14DO19, 14DO32, and 14DO154. All dates have been calibrated using a recent high-precision calibration curve developed by Stuiver and Becker (1986) and based on correlated dendrochronologic data from the US Pacific Northwest and Britain. Calibration was by means of a computer program based on this curve (Stuiver and Reimer 1987). When appropriate (i.e., when mean dates were close enough for their sigmas to overlap), some dates were averaged (cf. Long and Rippeteau 1974) and the average was calibrated. All radiocarbon laboratory dates, averages, and calibrations from the Clinton Lake Project area are provided in Appendix 2. Interpretations of these dates are found in the

appropriate site descriptions in chapter 6.

Geomorphic investigations were conducted by Mr. Rolfe Mandel of the University of Kansas. Mr. Mandel inspected each test unit profile and collected soils geomorphic data. He also inspected all backhoe trenches for similar information and, when possible, examined stream bank exposures for buried soils. The details of his methods of investigation and their results are provided in chapter 3 and in the geomorphic setting section that accompanies the description of each site in chapter 6.

Chapter 6

SITE DESCRIPTIONS

William Ranney, Rolfe D. Mandel, and Brad Logan

Introduction

This chapter describes each site in terms of previous research, the geomorphic setting, investigations conducted during the 1986 field season (July 2-September 6), cultural material recovered, site interpretation, and recommendations regarding National Register potential. Results of data analyses and syntheses are presented in chapters 7, 8 and 9; site evaluations and recommendations of significance and further research are summarized in chapter 10. Site designations follow the Smithsonian trinomial system. Artifact catalog numbers contain four-part designations with the first two being the county and site number, the third (86) refers to the year field work was conducted and the fourth is a sequential number for artifacts from a single site. Artifacts shown in figures are described by type and catalog number.

A general map of the project area (Fig. 1.2) shows the location of each investigated site. In all cases, elevations are in meters above or below datum, which has an assumed elevation of 100m. Contour intervals are either twenty or fifty cm. Specific deviations from general methods of site investigation (see chapter 5) are noted under the heading "1986 Investigations" herein. Where a number of surface artifacts were collected, these are identified in a table that refers to the designation "Artifacts" on the site maps that accompany each tested site description. Tables show the type of cultural material recovered by unit, level and depth below surface in centimeters. They contain two abbreviations that warrant explanation here: "Ret./Ut." denotes Retouched and/or Utilized, while "D.L. Scraper" refers to a Distal-Lateral Scraper.

14DO15

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Pomona
Topographic Setting: T-2 (?) terrace
Elevation: 277m msl
Parent Material: Alluvium
Slope: 2%
Drainage: Rock Creek

Previous Research

This small site was recorded during the initial survey of the Clinton Lake area (Chism 1966:11). Only a few pieces of lithic debris, including two blade fragments, and two body sherds described as cord-roughened and "vacuole-tempered" were

recovered at that time. The site was then assigned a Woodland affiliation. The pottery is apparently some from which the temper has been leached, a characteristic more common of Plains Village ware in the project area.

Geomorphic Setting

14DO15 is located on the scarp of an alluvial terrace in Rock Creek valley at an elevation of approximately 277m msl. The soil at the site is mapped as the Reading silt loam in the Douglas County soil survey (Dickey et al. 1977). Reading soils generally occur on T-1 terraces in the Wakarusa River basin (see chapter 3). However, based on the elevation of 14DO15, the site is probably on a T-2 terrace. Deep testing of the soil and underlying alluvium is needed to confirm the site's position in the landscape.

There is evidence of moderate soil erosion at 15DO15. With the exception of the soil profile exposed in Unit 3, the Ap horizon directly overlies the Bt horizon. Table 6.1 provides a detailed description of the soil profile in Unit 1. A silt loam Ap horizon abruptly gives way to a strongly developed silty clay Bt horizon; erosion has removed the BA horizon. Soil erosion at 14DO15 is primarily due to cultivation along the sloping scarp of the high alluvial terrace.

Table 6.1. Description of Soil Profile in Unit 1 at 14DO15.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) silt loam, dark brown (10YR3/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-25	Bt	Dark brown (10YR3/3) silty clay loam, brown (10YR 4/3) dry; common fine faint dark yellowish brown (10YR4/4) mottles; moderate medium subangular blocky structure; firm; very dark grayish brown (10YR3/2) coatings on some ped faces; common shiny surfaces on ped faces; thin discontinuous clay films; noneffervescent.

1986 Investigations

14DO15 was surveyed on August 11, and was determined to be approximately 1500 square meters in areal extent. The site is situated on a terrace immediately adjacent to a gravel road, and was planted in milo at the time of investigation. Visibility was between 40% and 60%, and the pedestrian survey revealed a limited surface scatter of lithic and ceramic material. The datum and excavation units were placed on August 18 and diagnostic surface artifacts were mapped (Fig. 6.1 and Table 6.2).

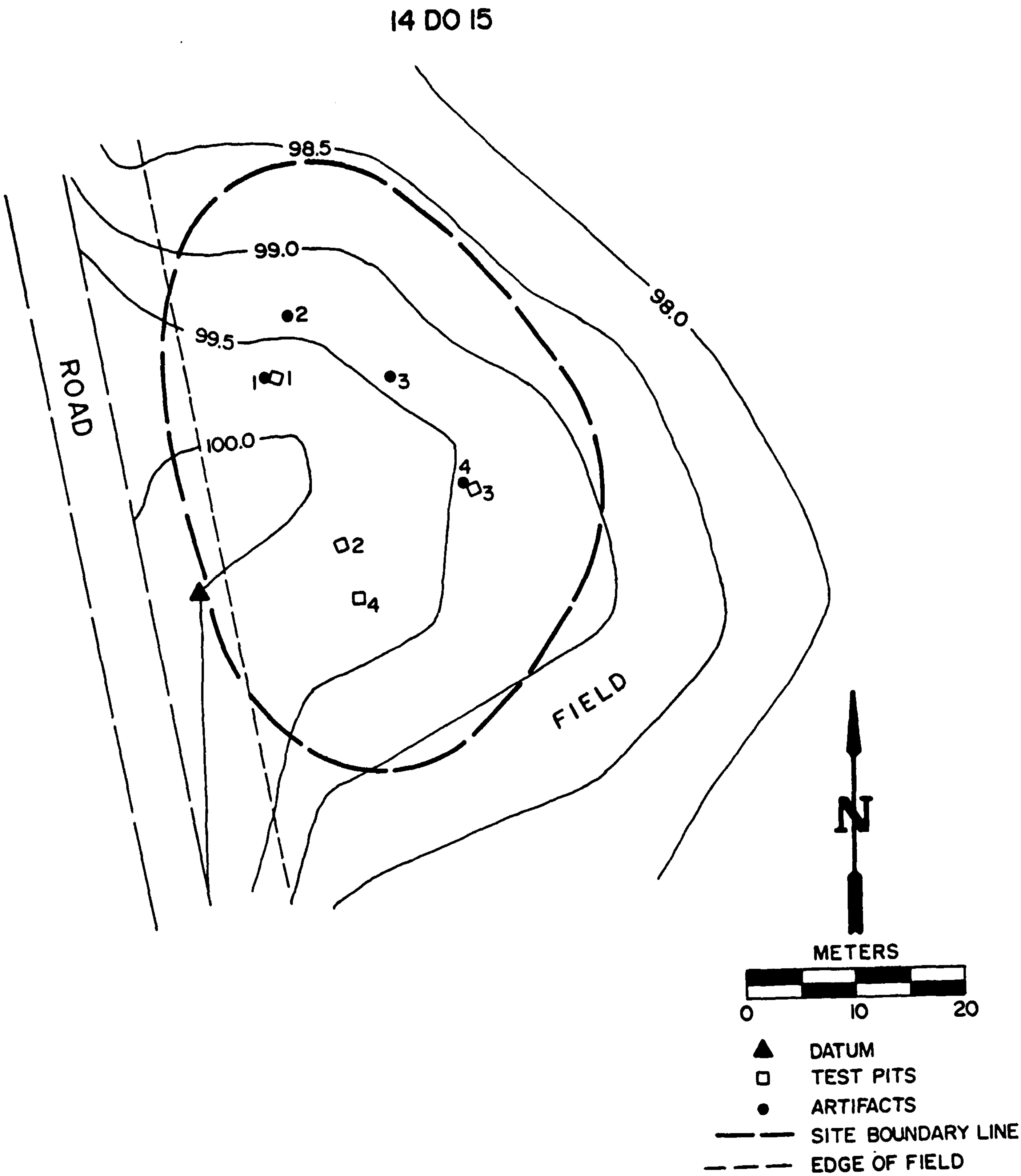


Figure 6.1. Map of 14DO15 showing location of surface finds and test units.

Excavation was done on August 21 and 22. Units 2 and 4 were located at the top of the terrace, and the majority of artifacts from these units was recovered from the upper 15 cm. Unit 2 yielded four pieces of debitage below 20 cm, while Unit 4 was culturally sterile below 20 cm. Unit 2 was taken down to 40 cm below surface in the western half of the square, but did not yield any artifacts. Units 1 and 3 were at the terrace scarp, and again showed that cultural material was concentrated in the upper 15 cm. Unit 3 did not show artifacts below 20 cm and Unit 1 was stopped at 20 cm. The plow zone varied from 15 to 18 cm in all units.

Table 6.2. Surface Artifacts from 14DO15 shown on Figure 6.1.

Artifact 1	1 Body Sherd
Artifact 2	2 Body Sherds, 1 Biface Fragment
Artifact 3	1 Bifacial Knife Fragment
Artifact 4	1 Body Sherd

Assemblage

The total artifact assemblage from 14DO15 included 216 pieces of debitage, 8 lithic tools, 35 body sherds and one faunal element (Table 6.3). Tools comprise 1% of the excavated lithic sample (two retouched/utilized flakes and a side-notched projectile point base, shown in Figure 6.2b), while the remaining 99% is shatter and flakes. A knife fragment and a biface fragment were found on the surface.

Table 6.3. Cultural Material Recovered from 14DO15.

Test Unit		xu1	xu1	xu2	xu2
Level	Sur-	1	2	1	2
(cm)	face	0-10	10-20	0-20	20-30
Sherds	4	7	7	4	-
Shatter		12	7	14	2
Flakes		53	28	42	2
Knife Frag.	1	-	-	-	-
Biface Frag.	1	-	-	-	-
Ret./Ut. Flake	3	2	-	-	-

Table 6.3. (cont').

Test Unit	xu2	xu3	xu3	xu4	xu4
Level	3	1	2	1	2
(cm)	30-40	0-20	20-25	0-20	20-30
Sherds	-	4	-	9	-
Shatter	-	6	-	13	-
Flakes	-	8	-	28	-
Proj. Pts.	-	-	-	1	-

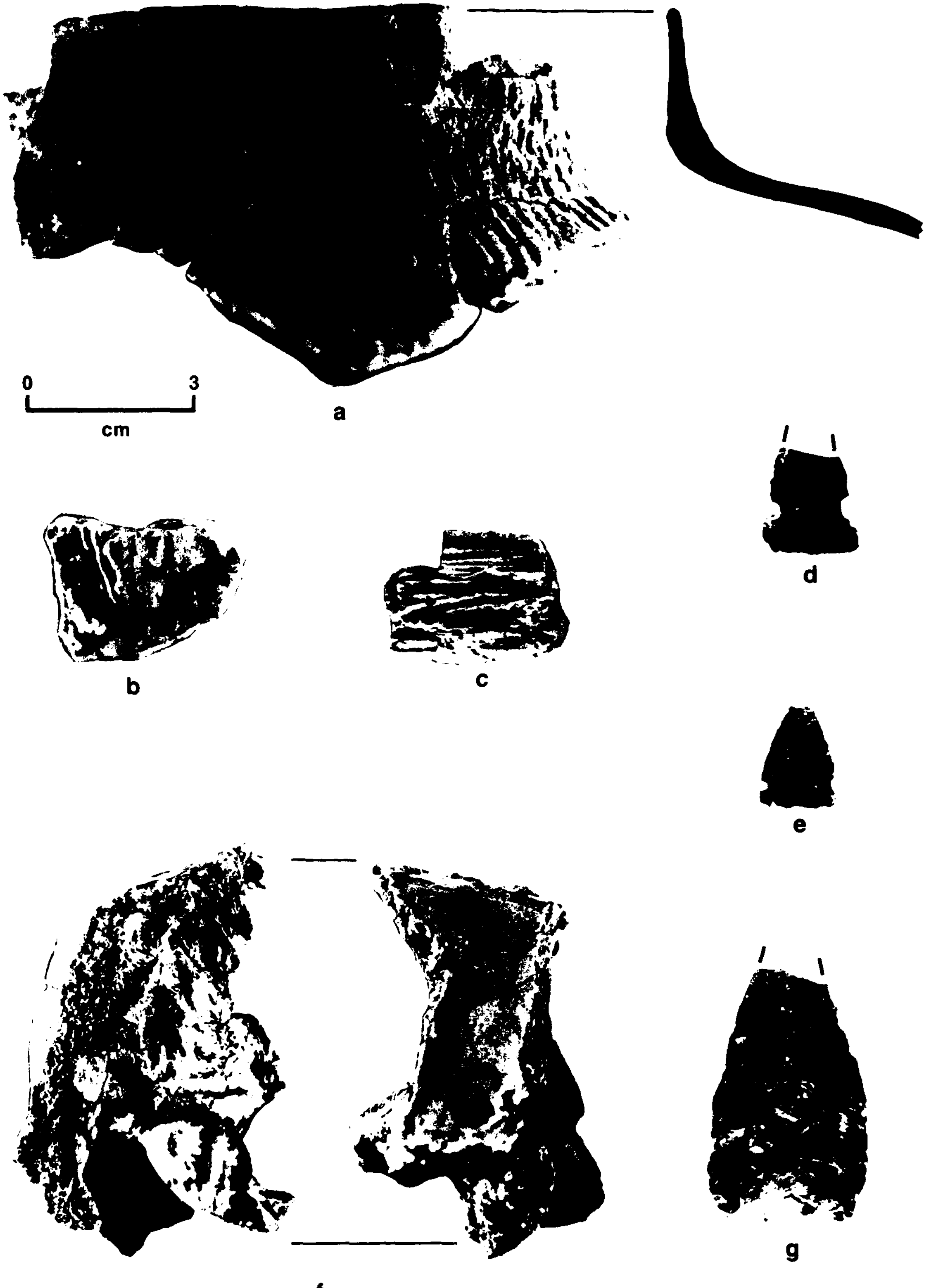


Figure 6.2 Selected artifacts from 14DO15, 14DO16, and 14DO19. a) rim sherd, DO16860170 b) eroded daub, DO19865276 c) non-eroded daub, DO19865277 d) side-notched arrow point, DO15860206 e) side-notched arrow point, DO19860106 f) occipital fragment of deer (Odocoileus virginianus) skull, DO19869163, posterior view to left and left lateral view to right g) knife, DO19860002. Right side of rim sherd profile is outside.

Five sherds from the ceramic assemblage indicate a Pomona cultural affiliation (see chapter 8), which is supported by the presence of the side-notched point. The faunal element is an unidentified tooth fragment. A small quantity of historic material (four pieces) was recovered from the excavation units.

Interpretations

Based on the location of the gravel road in relationship to the terrace, it is quite probable that this site has been partially destroyed by road construction. The surface scatter indicates that the site was limited to the small area at the top of the terrace. The lithic assemblage (see chapter 7) and diagnostic ceramics suggest that 14DO15 was a small hunting camp of the Pomona variant.

Recommendations

This site has probably been partially destroyed by construction of the nearby road and its cultural deposits are both shallow and sparse. For these reasons, it does not warrant consideration for nomination to the National Register.

14DO16

Name: Unnamed **Recorded:** KU, 1965
Cultural Affiliation: Pomona (Clinton Phase)
Topographic Setting: T-2(?) terrace **Elevation:** 277m msl
Parent Material: Alluvium **Slope:** 1%
Drainage: Rock Creek

Previous Research

14DO16 was first recorded by KU in 1965 on the basis of the report of an informant, whose collection contained lithic and ceramic materials then considered to be of Woodland affiliation. A subsequent survey in that year by KU resulted in the recovery of only lithic debris (Chism 1966:11). At that time, it was suggested that the site, which was found in a cultivated field, might extend eastward into the trees.

Geomorphic Setting

Site 14DO16 is located on the scarp of an alluvial terrace in Rock Creek valley at an elevation of approximately 277m msl. The soil at the site is mapped as Reading silt loam in the Douglas County soil survey (Dickey et al. 1977). As noted earlier, Reading soils occur on T-1 terraces in the Wakarusa drainage system. Site 14DO16, however, is on the same high terrace (T-2?) as 14DO15. Deep testing of the soil and underlying alluvium is needed to confirm the site's position in the landscape.

Soils at 14DO16 were examined in shallow archaeological test units. Table 6.4 provides a detailed description of the soil profile exposed in Unit 5. A 23cm-thick silt loam Ap horizon overlies a very dark grayish brown silty clay loam BA horizon. The BA horizon gradually gives way to a strongly developed silty clay loam Bt horizon.

Soil erosion at 14DO16 is largely restricted to the edge of the terrace scarp. Subsoil is visible at the land surface along the southeastern fringe of the site. Soil erosion at the site is primarily due to cultivation along the sloping scarp of the high alluvial terrace.

Table 6.4. Description of Soil Profile in Unit 5 at 14DO16.

Depth (cm)	Soil Horizon	Description
0-23	Ap	Black (10YR2/1) silt loam, very dark gray (10YR3/1) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
23-36	BA	Very dark grayish brown (10YR3/2) light silty clay loam; weak fine subangular blocky structure; firm; shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
36-50+	Bt	Dark brown (10YR3/3) heavy silty clay loam, brown (10YR4/3) dry; moderate medium subangular blocky structure; firm; common shiny surfaces on ped faces; black (10YR2/1) coatings on few ped faces; thin discontinuous clay films; noneffervescent.

1986 Investigations

14DO16 is situated along a terrace scarp, covering an area of approximately 2400 square meters (Figure 6.3). The site was visited on August 11, and was planted in soybeans. Visibility was very low (0% to 20%), but flakes were noted eroding from the scarp. The datum and five excavation units were established at this time, with Units 2, 4 and 5 above the scarp, Unit 3 below the scarp, and Unit 1 just outside the field and within a wooded area. Excavation was accomplished on August 13, 14 and 16. Unit 2 proved to be extremely difficult to excavate due to clay content, wet conditions, and its position near an erosional gully, so the unit was abandoned. As Unit 1 was yielding debitage and ceramics, and had possibly not been plowed, Unit 6 was established adjacent to Unit 1, replacing Unit 2.

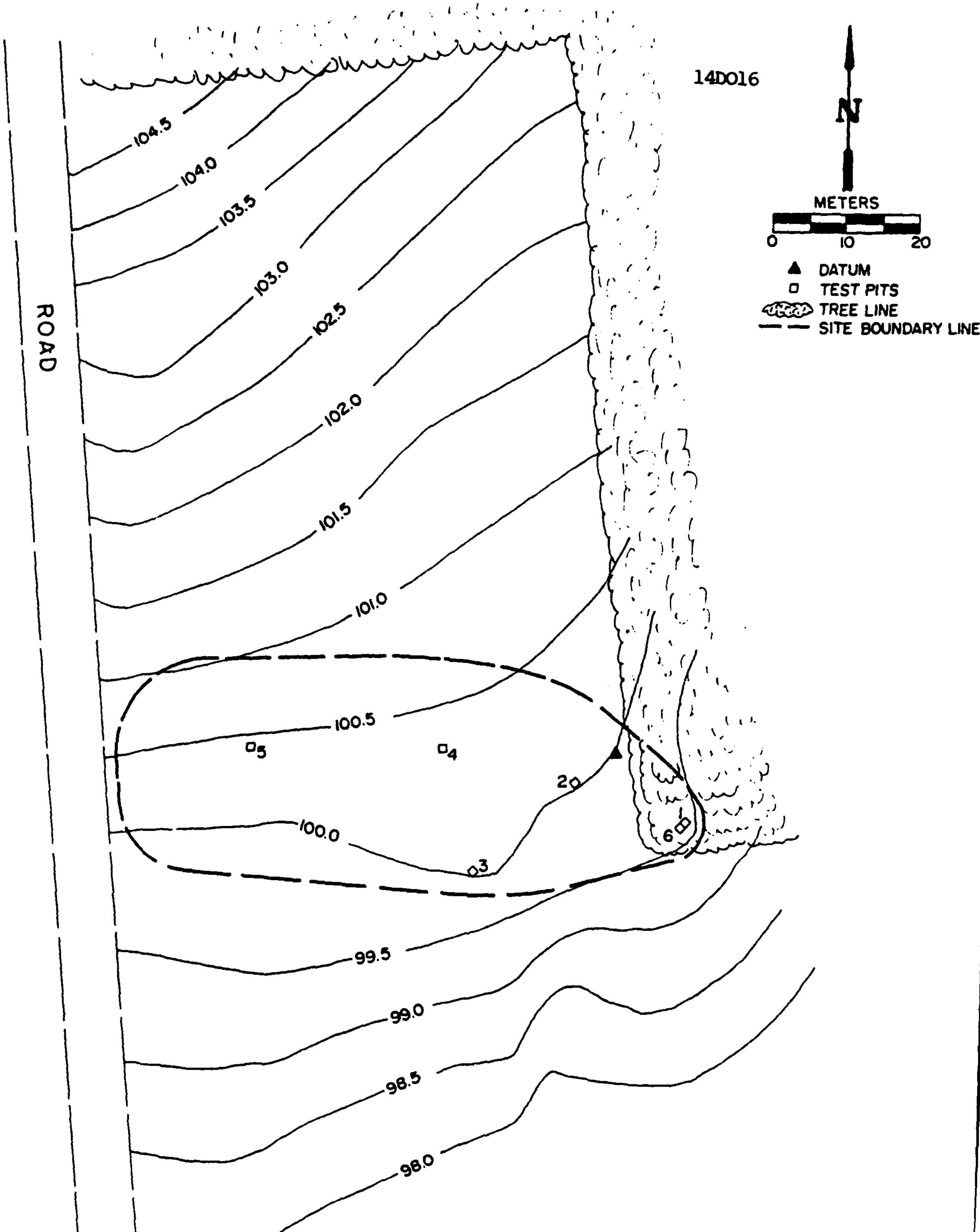


Figure 6.3 Map of 14DO16 showing location of test units

All units showed the heaviest concentration of cultural material in the upper 20 cm, although artifacts did appear as deep as 50 cm below surface. Unit 5, Level 3 produced a rim sherd of the Pomona variant (Fig. 6.2a), and a large body sherd at the base of the level (30 cm below surface). Units 1 and 6, within the treeline, did not show a noticeable difference from the other excavations, suggesting disturbance had occurred there also. Small amounts of charcoal appeared in these two units from 0 to 35 cm below surface. Naturally occurring cherts were present in all units.

Assemblage

Cultural material from 14DO16 consisted of 200 lithic artifacts and 42 ceramic artifacts, in addition to a small number of faunal remains (Table 6.5). Tools accounted for 4% of the lithic assemblage, while one rim sherd and eight body sherds were attributable to the Clinton phase of the Pomona variant. The faunal material consisted of five unidentifiable bone fragments and two gastropod shells.

Table 6.5. Cultural Material Recovered from 14DO16.

Test Unit	xu1	xu1	xu1	xu1	xu2	xu3	xu3
Level	1	2	3	4	1	1	2
(cm)	0-10	10-20	20-30	30-40	0-10	0-20	20-30
Sherds	6	5	3	1	1	4	-
Shatter	4	7	4	2	3	7	1
Flakes	3	18	8	6	3	12	2
Tested Matl.	-	-	2	-	-	-	-
Biface Frag.	-	-	1	-	-	1	-
Ret./Ut. Chip	-	-	-	-	1	-	-
Ret./Ut. Blade	-	-	-	-	1	-	-
Fauna	-	3	1	-	-	-	-

Table 6.5. (cont').

Test Unit	xu3	xu4	xu4	xu4	xu4	xu5	xu5
Level	3	1	2	3	4	1	2
(cm)	30-40	0-20	20-30	30-40	40-50	0-10	10-20
Sherds	-	-	-	-	-	2	-
Shatter	-	1	3	-	1	1	-
Flakes	-	17	11	4	1	8	4
Biface Frag.	-	1	-	-	-	-	-
Ret./Ut. Chip	-	-	1	-	-	-	-

Table 6.5. (cont').

Test Unit Level (cm)	xu5 3 20-30	xu5 4 30-40	xu5 5 40-50	xu6 1 0-10	xu6 2 10-20	xu6 3 20-30	xu6 4 30-40
Sherds	3	1	-	2	6	7	-
Rim Sherds	1	-	-	-	-	-	-
Shatter	2	1	-	7	7	4	1
Flakes	2	3	3	12	10	5	1
Notch/Flake	-	-	-	-	-	-	1
Ret./Ut. Shatter	-	-	1	-	-	-	-
Fauna	-	-	-	-	2	1	-

Interpretations

Neither evidence of structures nor a large quantity of material culture remains were present at the site, suggesting a short-term occupation. Disturbance by historic agricultural practices is evident from the highest density of artifacts appearing in the plow zone. The location of the surface scatter along the length of the terrace scarp suggests erosion and the redeposition of artifacts.

Recommendations

Although some cultural material was discovered at this small site below the plow zone, it is of limited quantity. Moreover, the depth may be attributable to the disturbance caused by roots (particularly in the area of Units 1 and 6) and slopewash. Considering the paucity of cultural material at this site, it is not considered eligible for the National Register.

14DO19

Name: Hatcher Site **Recorded:** KU, 1965
Cultural Affiliation: Pomona (Clinton phase)
Topographic Setting: T-1 & T-2 terraces **Elevation:** 269-275m msl
Parent Material: Alluvium **Slope:** 1%
Drainage: Rock Creek

Previous Investigations

The Hatcher site was recorded by KU (Chism 1966:12) and subsequently excavated by that institution in 1966 (Johnson 1968:54-97; Fig. 6.4). Three areas of concentrated cultural materials were defined as A, B, and C. Area A, near the center of the site, consisted of a concentration of daub, ceramics,

and debitage. Excavation in that area revealed the remains of a habitation structure and associated storage pit (Feature 2). Charcoal from this feature was later (1983) submitted for radiocarbon dating. The date obtained is 1075±65 B.P.: A.D. 875 (Brown 1985). Area B was marked by a concentration of burned limestone fragments thought to represent the remains of a hearth. Daub was found in that area too but excavation failed to reveal anything cultural below plow zone. Area C, like Area A, was indicated by a concentration of daub, chert flakes, and ceramics. Excavation in that area revealed the remains of a structure, hearth, storage pit, and two grinding slabs.

On the basis of the data recovered during the 1966 excavation of the Hatcher site, Johnson (1968:133-137) defined the Clinton phase of the Central Plains Tradition. This taxonomic unit has subsequently been reassigned to the Pomona variant (Brown 1985).

Geomorphic Setting

Site 14DO19 is located on T-1 and T-2 terraces in Rock Creek valley at an elevation of 269 to 275 m msl. Areas A and B are situated on a small remnant of the T-2 terrace that is approximately two meters above the adjacent T-1 surface (Fig. 6.5). Area C is is on the T-1 surface about 30 m northeast of Area A. Areas A and C are separated by a channel scar on the T-1 surface.

A single backhoe trench was excavated on the T-2 surface in Area A. This trench revealed a well-developed soil similar to other T-2 soils examined in the project area. The soil is characterized by a thick, dark, silt loam A horizon that gradually give way to a dark yellowish brown, silty clay Bt horizon (Table 6.6). The argillic horizon is 169 cm thick and it exhibits strong structural development.

The soil on the T-1 surface in Area C is the Reading silt loam. This soil is not as thick or as strongly oxidized as the T-2 soil in Areas A and B. Table 6.7 provides a detailed description of the T-1 soil exposed in Trench 3. The Reading soil has a thick, very dark brown silt loam A horizon that gradually gives way to a dark brown silty clay loam Bt horizon. The argillic horizon is 126 cm thick and it exhibits moderate fine subangular blocky structure. Charcoal, bone, and chert flakes were observed in the upper 25 cm of the Bt horizon. A distinct textural change marks the boundary between the Bt horizon and the underlying 2C horizon. The 2C is dark brown coarse silty loam with many fine coal fragments. This coarse alluvium appears to be a lateral accretion deposit. The coal fragments were derived from outcrops along the streambank of Rock Creek.

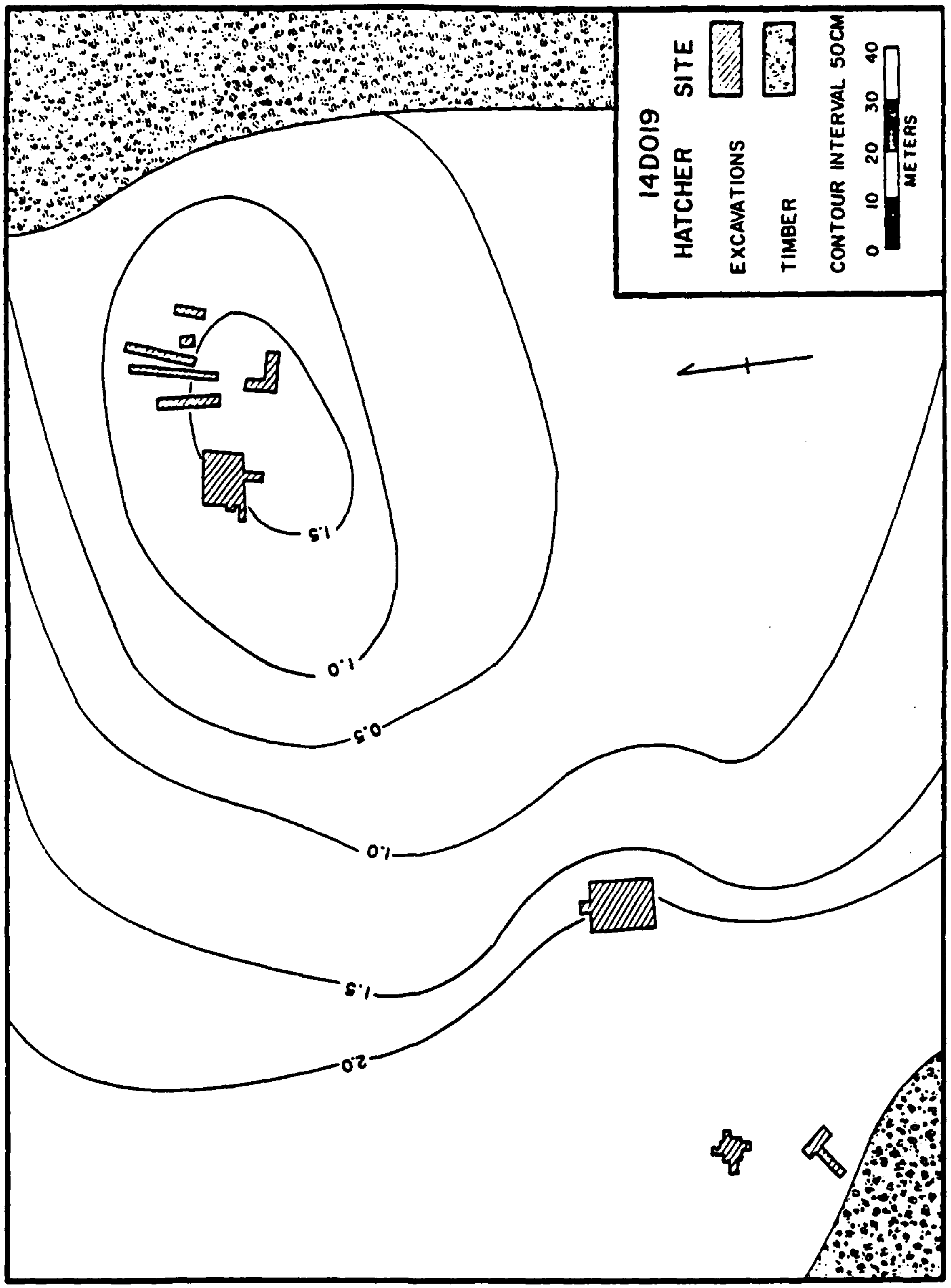


Figure 6.4. Location of excavations at 14DO19 by the University of Kansas in 1966. From Johnson (1968:55).

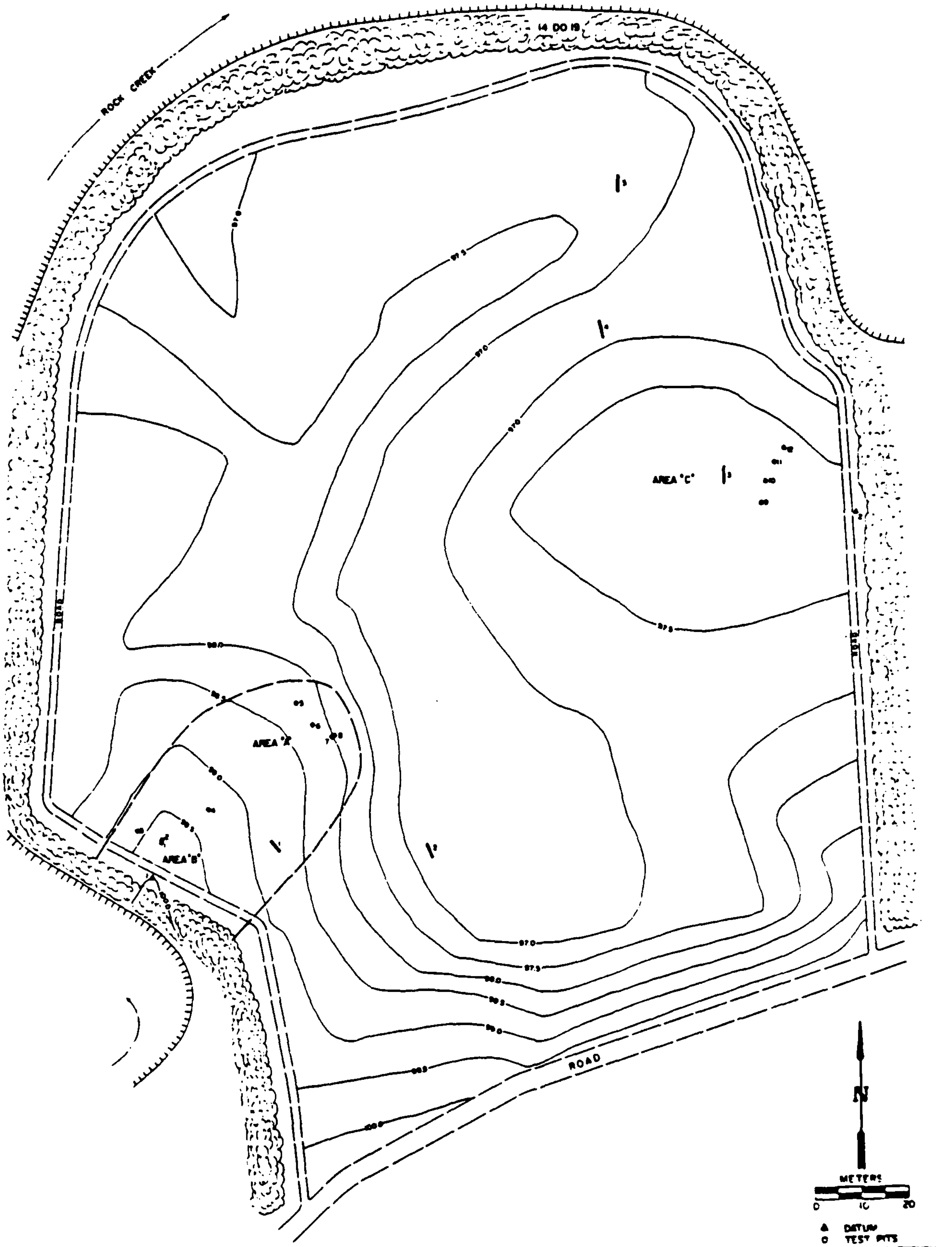


Figure 6.5. Map of 14DO19 showing location of test units and backhoe trenches. Compare with Figure 6.4.

Table 6.6. Description of Soil Profile in Trench 1 at 14DO19.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR3/2) silt loam, grayish brown (10YR5/2) dry; weak fine and medium granular structure; friable; noneffervescent; abrupt smooth boundary.
20-35	A	Very dark grayish brown (10YR3/2) heavy silt loam, dark grayish brown (10YR4/2) dry; moderate medium granular structure; firm; noneffervescent; gradual smooth boundary.
35-46	BA	Dark brown (10YR3/3) light silty clay loam, brown (10YR4/3) dry; weak fine subangular blocky structure; firm; shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
46-157	Bt1	Dark yellowish brown (10YR4/4) silty clay, yellowish brown(10YR5/4) dry; moderate medium subangular blocky structure; firm; thin continuous clay films on ped faces; few fine ferromanganese concretions; common fine pores; noneffervescent; gradual smooth boundary.
157-215	Bt2	Dark yellowish brown (10YR4/4) heavy silty clay, yellowish brown (10YR5/4) dry; moderate medium subangular blocky structure; firm; dark brown (10YR3/3) coatings in root channels; thin continuous clay films on ped faces; few fine ferromanganese concretions; common fine pores; noneffervescent; gradual smooth boundary.
315-226	BC	Dark yellowish brown (10YR4/4) silty clay loam, yellowish brown (10YR5/4) dry; moderate fine subangular blocky structure; firm; patchy clay films; common fine pores; noneffervescent; gradual smooth boundary.
226-330+	C	Yellowish brown (10YR5/6) silt loam, yellowish brown (10YR5/4) dry; massive; firm; common fine pores; noneffervescent;

Table 6.7. Description of Soil Profile in Trench 3 at 14DO19.

Depth (cm)	Soil Horizon	Description
0-17	Ap	Very dark brown (10YR2/2) silt loam, dark brown (100YR3/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
17-35	A	Very dark brown (10YR2/2) silt loam, very dark grayish brown (10YR3/2) dry; weak medium granular structure; friable; noneffervescent; gradual smooth boundary.
35-46	BA	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; weak fine subangular blocky structure; firm; common shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
46-134	Bt1	Dark brown (10YR3/3) heavy silty clay loam, brown (10YR4/3) dry; moderate medium and fine subangular blocky structure; firm; common very dark grayish brown (10YR3/2) coatings in root channels and on ped faces; thin discontinuous clay films; noneffervescent; gradual smooth boundary.
134-172	Bt2	Dark brown (10YR3/3) light silty clay loam, brown (10YR4/3) dry; moderate fine subangular blocky structure; firm; thin discontinuous clay films; noneffervescent; clear smooth boundary.
172-243+	2C	Dark brown (10YR3/3) coarse sandy loam, brown (10YR4/3) dry; massive; firm; very gritty; common fine particles of coal; noneffervescent.

A backhoe trench (Trench 2 in Fig. 6.5) was excavated in the channel scar between Areas A and C. Table 6.8 provides a detailed description of the soil profile exposed in Trench 2. Although no cultural materials were discovered on or below the surface of the silty channel-fill deposit, two buried soils were observed on the walls of the trench. The surfaces of 2Ab and 3Ab occur at depths of 38 and 179 cm respectively. The paleosols, like the modern surface soil, have A/C profiles; they did not develop long enough to form any B horizon characteristics. Thin lenses of very fine charcoal particles are

common in the 3Ab horizon, but attempts to isolate the charcoal for radiocarbon dating were unsuccessful. Based on the soils evidence, the upper three meters of the channel-fill deposit is probably less than 1000 years old.

Table 6.8. Description of Soil Profile in Trench 2 at 14DO19.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) silt loam, dark brown (10YR3/3) dry; weak fine granular structure; friable; noneffervescent; diffuse boundary.
15-38	AC	Dark brown (10YR3/3) silt loam, brown (10YR4/3) dry; weak thick platy structure parting to fine granular structure; friable; noneffervescent; abrupt smooth boundary.
38-60	2Ab	Black (10YR2/1) heavy silt loam, very dark gray (10YR3/1) dry; weak fine granular structure; friable; noneffervescent; gradual smooth boundary.
60-127	2ACb	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; weak fine and medium granular structure; friable; noneffervescent; gradual smooth boundary.
127-172	2Cb	Mottled dark brown (10YR3/3), brown (10YR4/3), and dark yellowish brown (10YR4/4) silty clay loam; massive and very fine subangular blocky structure; firm; noneffervescent; abrupt smooth boundary.
172-198	3Ab	Black (10YR2/1) silty clay loam, very dark gray (10YR3/1) dry; very fine subangular blocky structure; firm; thin lenses (1-3mm thick) of very fine charcoal particles throughout the horizon; noneffervescent; gradual smooth boundary.
198-304	3Cb	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; massive and very fine subangular blocky structure; firm; common flecks of charcoal; noneffervescent.

The absolute ages of alluvial fills at 14DO19 are not known. A radiocarbon date from the T-2 terrace at 14SH101 indicates that sediments in the upper two meters of the fill accumulated during the late Wisconsinan. Thus, if the T-2 terrace at 14DO19 is the same age as the one at 14SH101, Paleoindian materials may be deeply buried beneath the T-2 surface at 14DO19. Soil evidence indicates that the T-2 surface has been sufficiently stable since late Wisconsinan time and may therefore have evidence of Paleoindian and later cultural periods on its surface.

In Area C, radiocarbon dates of 1075±65 and 970±60 years B.P. were determined on charcoal recovered just below the plow zone (see Previous Investigations above and chapter 10). These dates indicate that the T-1 surface at 14DO19 was stable by at least ca. 1000 B.P. Radiocarbon dates, soil-geomorphic evidence, and archaeological data from other sites in the Wakarusa River basin indicate that T-1 surfaces were beginning to stabilize as early as 3000 B.P. Thus, Late Archaic and later prehistoric sites may be on or at shallow depths below the T-1 surface at 14DO19. The high potential for shallow buried sites in T-1 fill was demonstrated by the discovery of a cultural horizon at a depth of 65-80 cm in Trench 3.

1986 Investigations

A thorough survey of the site was conducted on August 13. At that time the site was in soybeans and visibility was limited to about 60%. Nonetheless, it was possible to discern cultural material in two of the areas defined in 1966 (Fig. 6.5). One of these consisted of a concentration of lithic material on the western edge of the field and adjoining access road. This locality corresponds to Johnson's (1968) Area B. Recovered artifacts include three knives (Figs. 6.2g [p. 56] and 6.6a,e). Survey also revealed a concentration of daub on the edge of the T-2 terrace in a locality that corresponds to Area A. At the time of the survey, we were accompanied by Dr. Alfred E. Johnson, who reviewed his notes, photographs and other documentation from the 1966 investigation. He was able to confirm that these areas were indeed those he had excavated. Unfortunately, because he had excavated the Hatcher site in the belief that it was to be inundated by Clinton Lake, no datum had been defined. Consequently, the <u>exact</u> location of the excavations of 1966 in Areas A and B could not be determined.

A datum was established on the west side of the access road and in Area B. From this reference point, Units 1-4 were laid cut along the edge of the cultivated field in an area that, according to the documentation in Johnson's possession, had not been previously excavated. Units 5-8 were laid out along the edge of the terrace in Area A. Units 7 and 8 were purposefully placed in the area of daub concentration. These units were located in areas thought to be away from the block excavation of 1966 (cf. Figs. 6.4 and 6.5).

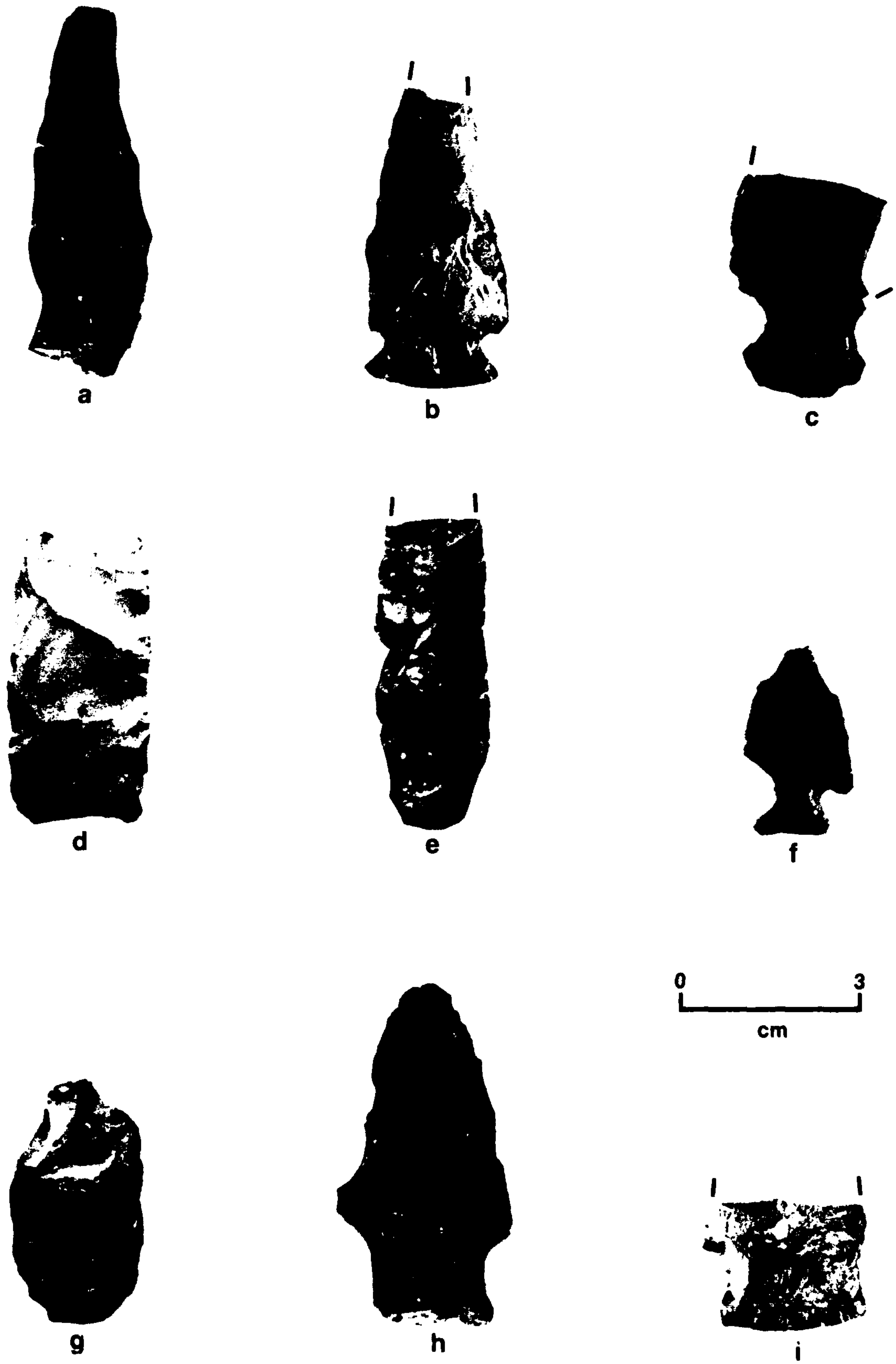


Figure 6.6. Selected artifacts from 14DO19, 14DO32, and 14DO35. a) knife, DO19860001 b) corner-notched projectile point, DO32860001 c) corner-notched projectile point, DO32860003 d) knife, DO19860087 e) knife, DO19860005 f) corner-notched projectile point with reworked tip, DO32860004 g) distal-lateral scraper, DO32860006 h) expanding-stemmed projectile point, DO35860004 i) expanding-stemmed projectile point, DO32860007.

Survey in Area C did not yield any cultural finds. In order to determine if there were any cultural deposits as yet unexplored in this area, Units 9-12 were established with reference to a secondary datum fixed on the east side of the site (Fig. 6.5; the site was mapped with respect to Datum 1). Given the fact that the 1966 investigations in this area also had no permanent reference point, we were only able to estimate the approximate location of the block and trench excavations shown on Figure 6.4. It was apparent from photographs in Johnson's possession that the tree line shown on that map had changed little in the intervening period of 20 years. Since the easternmost excavations of 1966 in Area C occurred more than 30 meters from the treeline, it was decided to establish Units 9-12 along a 30 meter arch in that area (Fig. 6.5). This guaranteed that no unit would be placed in an area of backfill from the prior investigation.

All test units in Area B contained cultural material but none produced any below plow zone. Artifacts found in the units in this area include a side-notched arrow point (Fig. 6.2e [p. 56]) and knife (Fig. 6.6d). The absence of artifacts below the plow zone confirms the findings of the 1966 investigation that this area of the Hatcher site has been severely eroded and disturbed by plowing.

While Units 5 and 6 in Area A contained little cultural material, Units 7 and 8 were rich in daub (Table 6.9) and also contained a fair amount of lithic artifacts (Table 6.10). While more abundant in terms of both counts and weight in the plow zone (0-20 cm below surface), the daub is present in considerable quantity in the lower levels, indicating that some of the deposits in this area have not been completely disturbed by agriculture. Two characteristics of the daub in the sub-plow zone levels of these units reflect the relative lack of disturbance. Pieces of daub in the lower levels tended to be larger and less eroded than those in the plow zone (Figs. 6.7 and 6.8; cf. Fig. 6.2b,c [p.56]). The base of the daub concentration probably corresponds to the floor of the structure. Thus, whatever cultural materials or features existed at the time of the structure's occupation may yet remain relatively intact.

Table 6.9. Daub from 14DO19, Counts & Weights by Unit and Level.

Unit Number	Level	Count	Weight (gms)
6	1 (0-20)	445	375.5
6	2 (20-30)	21	29.0
7	1 (0-20)	3572	2744.5
7	2 (20-30)	879	1005.5
7	3 (30-40)	24	21.5
8	1 (0-20)	2648	2017.0
8	2 (20-30)	1045	1204.0
Totals		8634	7397.0

Table 6.10. Cultural Material Recovered from 14DO19.

Test Unit Level (cm)	Surface	xu1 1 0-20	xu1 2 20-30	xu2 1 0-20	xu3 1 0-20	xu3 2 20-30
Sherds	-	1	-	1	1	-
Shatter		11	-	10	2	-
Flakes		25	-	29	28	-
Proj. Pts.	1	-	-	1	-	-
Knife	1	-	-	-	-	-
Knife Frag.	1	-	-	-	-	-
Ret./Ut. Flake	-	1	-	-	-	-
Ret./Ut. Flake/Chip	-	-	-	1	-	-

Table 6.10. (cont').

Test Unit Level (cm)	xu4 1 0-20	xu4 2 20-30	xu5 1 0-20	xu5 2 20-30	xu5 3 30-40	xu6 1 0-20
Sherds	3	-	-	-	-	1
Shatter	4	-	-	-	-	-
Flakes	23	2	1	-	-	3
Ret./Ut. Flake	1	-	-	-	-	-
Bone	-	-	-	-	-	1

Table 6.10. (cont').

Test Unit Level (cm)	xu6 2 20-30	xu6 3 30-40	xu7 1 0-20	xu7 2 20-30	xu7 3 30-40	xu8 1 0-20
Sherds	3	-	11	4	1	1
Rim Sherds	-	-	-	-	-	1
Shatter	-	-	10	2	-	1
Flakes	1	1	35	7	2	-
Proj. Pts.	-	-	1	-	-	-
Biface Frag.	-	-	-	1	-	-
End Scraper	-	-	1	-	-	-
Bone	-	-	8	-	-	-

Table 6.10. (cont').

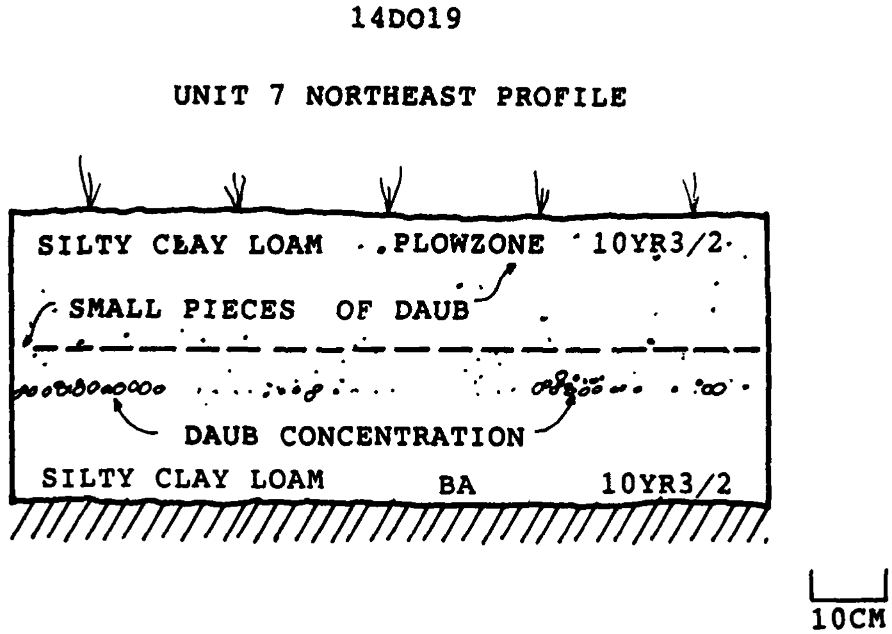
Test Unit Level (cm)	xu8 2 20-30	xu9 1 0-30	xu9 2 30-40	xu9 3 40-50	xu10 1 0-20	xu10 2 20-30
Shatter	3	1	-	-	1	-
Flakes	1	-	-	-	-	-
Biface Frag.	1	-	-	-	-	-
Ret./Ut. Flake	1	-	-	-	-	-
Bone	2	1	6	7	1	3

Table 6.10. (cont').

Test Unit Level (cm)	xu11 1 0-20	xu11 2 20-30	xu11 3 30-40	xu11 4 40-50	xu12 1 0-24	xu12 2 24-34	Trench 3
Shatter	-	1	-	-	-	-	-
Flakes	-	1	1	-	-	-	4
Proj. Pts.	-	-	-	1	-	-	-
Ret./Ut. Flake	-	-	-	-	-	-	1
Ret./Ut. Blade	-	-	-	-	-	-	1
Bone	4	3	1	2	5	1	3

Test excavation in Area C did not reveal significant quantities of cultural material (Table 6.10). Interestingly, a fair amount of bone, albiet in poor condition, was recovered from several of the units in this area (see the faunal analysis section of chapter 9). While sparse, lithic material did occur in levels below tne plow zone. This included a small, side notched arrow point fragment found in Unit 11, Level 4. There was no unambiguous evidence of disturbance by rodents in this area. so the depth of this material is not clearly attributable to non-cultural factors.

The clearest evidence of the presence of intact cultural materials in Area C was discovered in the west wall of Trench 3. Lithic artifacts, including a retouched flake, and animal bone, including a fragment of a deer skull (Fig. 6.2f [p. 56]) and small burned pieces, were recorded _in situ_ at a depth of 65-80 cm below surface (Fig. 6.9). The lack of diagnostic artifacts or radiocarbon dates precludes assignment of this buried component to any complex.



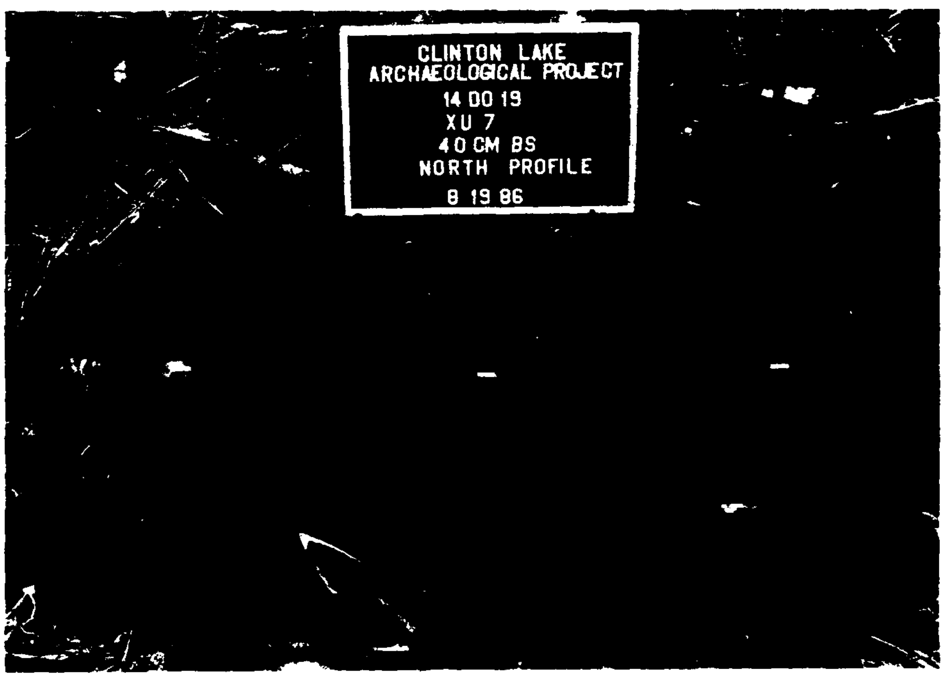


Figure 6.7. Northeast profile of Unit 7 at 14DO19 showing daub concentration below plow zone.

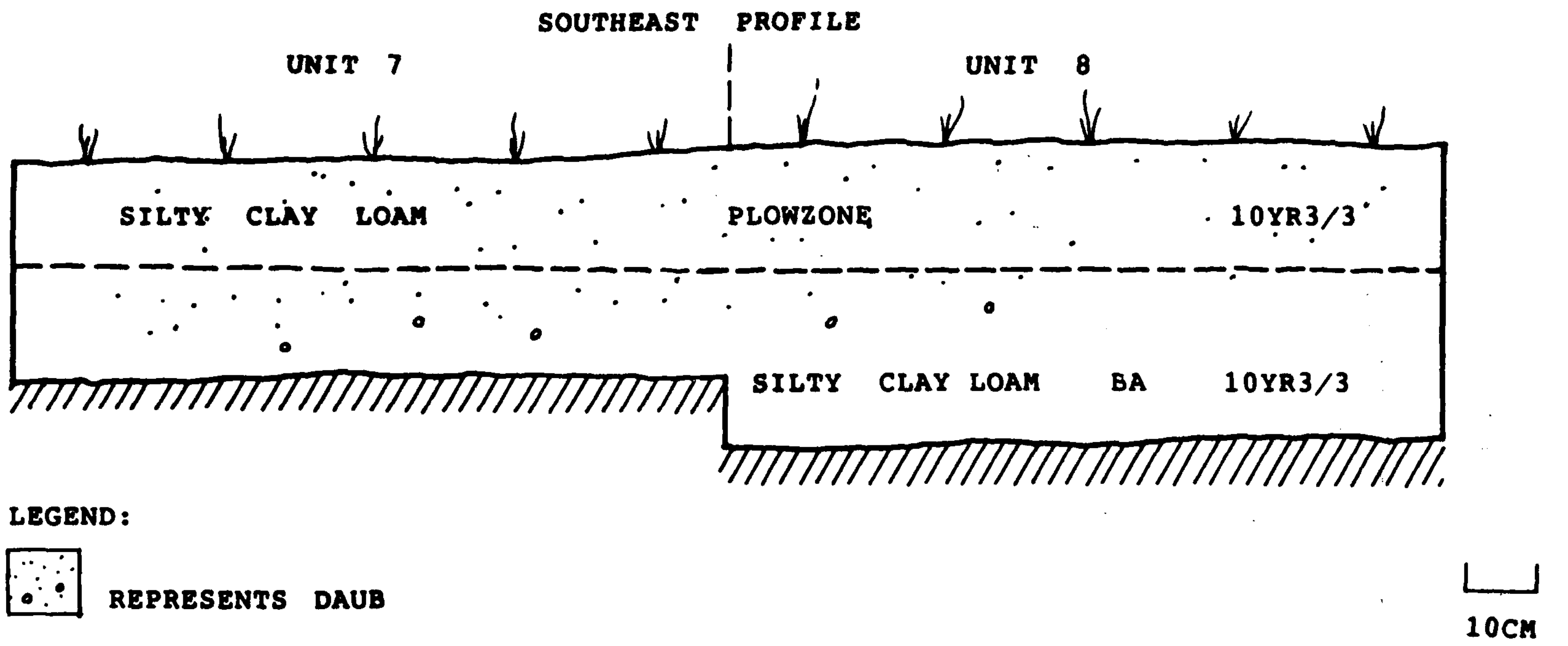


Figure 6.8 Southeast profile of Units 7 and 8 at 14DO19 showing daub concentration below plow zone.

Figure 6.9. West wall of Trench 3 in Area C at 14DO19 showing *in situ* flake tool and bone.

Assemblage

The total artifact assemblage from the Hatcher site consists of 210 pieces of debitage, 16 chipped stone tools, 28 potsherds, and 48 pieces of bone (Table 6.10). All diagnostic artifacts are attributable to the previously identified Clinton phase occupation. Arrow points recovered in all three areas indicate contemporaneous or penecontemporaneous occupation. The ceramic assemblage, though small, is also compatible with the Clinton phase assignment. The buried component exposed in Area C did not yield any diagnostic materials and it is not possible at present to identify it as an earlier Pomona occupation or one representative of a different culture complex.

Interpretations

While the relatively small quantity of artifacts from the Hatcher site seems to reflect only temporary occupancy of the site, the daub concentration in Area A suggests at least a seasonal residence. Given the considerable evidence uncovered after major excavations in 1966 in both Areas A and C and the data gathered during our more limited test excavations, it is suggested that the site represents a more prolonged occupation than the small Pomona campsites represented by 14DO15 and 14DO16. It may be that the latter sites, which are both located a short distance from 14DO19, had an ancillary relationship with the Hatcher site. These smaller sites may have been the scene of short-term resource procurement for the main residence at the Hatcher site.

Recommendations

Although plowing has disturbed the upper portion of the remains of a structure in Area A, a significant portion remains intact. If the base of the daub layer represents the floor of the structure to which the daub belonged, then significant information may yet be preserved. Although the Pomona component excavated in Area C in 1966 was not well represented during the 1986 test excavations, backhoe trenching did reveal a more deeply buried component that has not yet been adequately explored. A single deer bone exhibiting a "green bone" breakage that was found at a depth of 72 cm below surface in Trench 5 north of Area C and opposite it from an old meander scar also suggests this buried component occurs in that hitherto unexplored area. On the basis of these findings, it is suggested that the site retains significant research potential and it is recommended that the site be considered for placement on the National Register. A more detailed discussion of potential research goals for any future investigation of the Hatcher site is presented in chapter 10.

14DO32

Name: Anderson Site **Recorded:** KU, 1965
Cultural Affiliation: Plains Woodland, Pomona (Maybrook phase)
Topographic Setting: T-2 terrace **Elevation:** 273-274m msl
Parent Material: Alluvium **Slope:** 1%
Drainage: Deer Creek

Previous Investigations

The Anderson site was first surveyed by the University of Kansas in 1965, at which time a "great quantity of flint spalls, burned limestone", some chipped stone tools and ceramic artifacts were collected (Chism 1966:16). The site was then assigned a Woodland affiliation. Subsequent excavations by that institution in 1966 delineated the remains of a habitation, six storage pits, and a burial (Johnson 1968:29-53). The location of these excavations is shown in Figure 6.10. On the basis of the recovered data, Johnson (1968:132-133) recognized two components, one assigned to the Deer Creek phase of the Plains Woodland period and another, represented by the habitation and features, assigned to the Clinton phase of the "Central Plains Tradition". The latter component has recently been reassigned to the May Brook phase of the Pomona variant (Brown 1985). A radiocarbon date of 950±150 B.P.: A.D. 1000 (Brown 1985) was obtained on a sample of charcoal recovered during the 1966 investigation from Feature 6, a storage pit located within the structure. The earlier component was indicated by the presence of Scallorn arrow points, large corner-notched points, and thick, cordmarked, heavily tempered potsherds.

Geomorphic Setting

The site is located on the T-2 terrace in Deer Creek valley. It is at an elevation of approximately 273-274m msl. The northern boundary of the site is marked by a short, steeply sloping scarp that separates the T-2 fill from the lower T-1 fill. Erosion along the scarp has exposed subsoil and patches of alluvial gravel.

The soil at 14DO32 is mapped as the Vinland-Martin complex in the Douglas County soil survey (Dickey et al. 1977). The Vinland and Martin soils are formed in residuum derived from shale. The soil at 14DO32, however, is too low in the landscape to be a residual soil, and it is clearly formed on a terrace surface. As noted in chapter 3 of this report, alluvial soils on high terraces have been mistaken for residual soils in the Wakarusa River valley. Table 6.11 provides a detailed description of the soil profile exposed in Trench 1. The soil is characterized by a thick, dark grayish brown to very dark brown, silty A horizon. The mollic epipedon gradually gives way to a thick, dark yellowish brown silty clay Bt horizon that exhibits strong structural development. The C horizon is dark yellowish brown loam. Bedrock was not reached in the three meter deep backhoe trench.

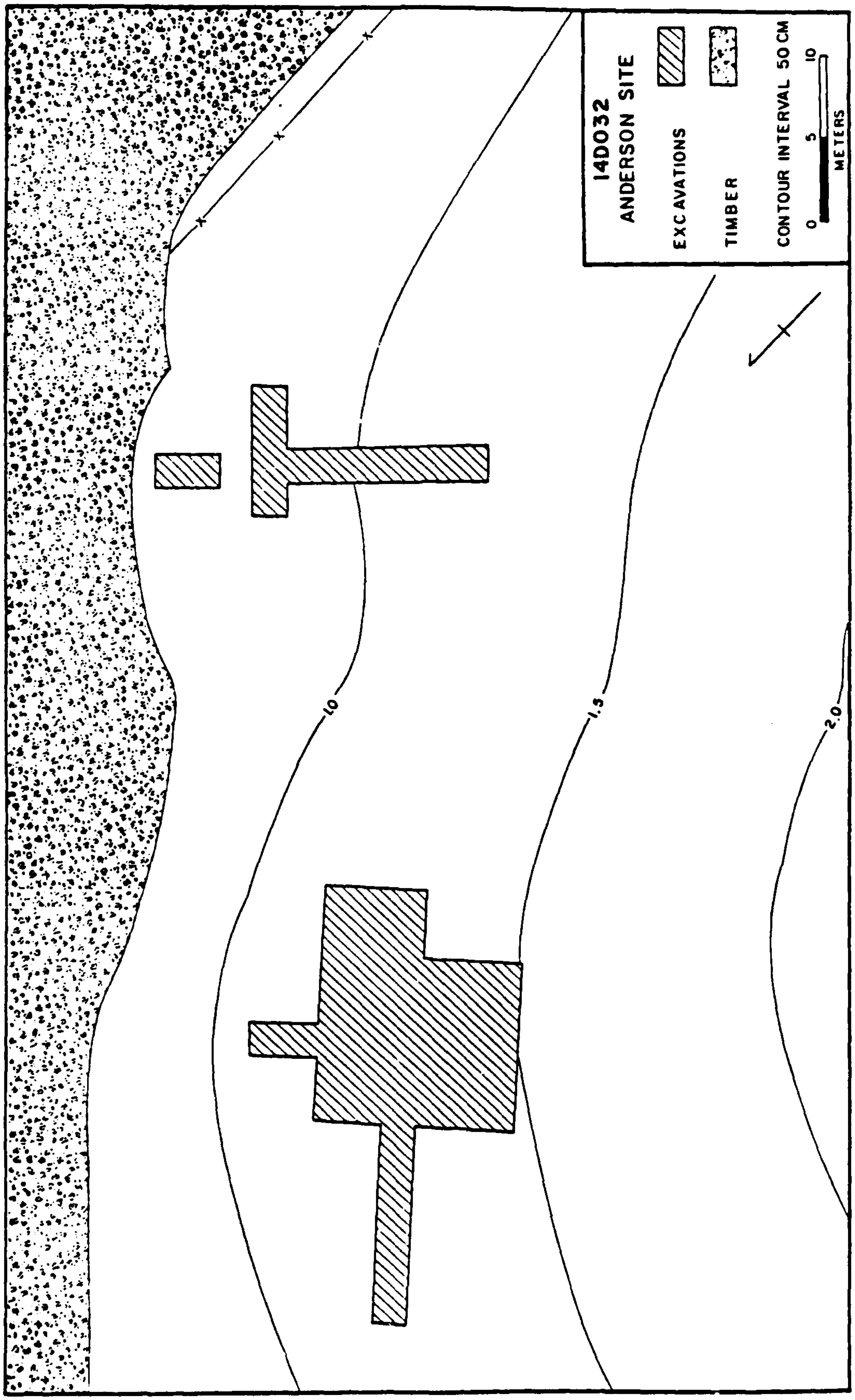


Figure 6.10. Location of excavations at 14DO32 by the University of Kansas in 1966. From Johnson (1968:30)

Table 6.11. Description of Soil Profile in Trench 1 at 14DO32.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR3/2) silt loam, dark grayish brown (10YR4/2) dry; weak medium and fine granular structure; friable; non-effervescent; abrupt smooth boundary.
20-37	A	Very dark brown (10YR2/2) heavy silt loam, very dark grayish brown (10YR3/2) dry; moderate medium granular structure; firm; noneffervescent; gradual smooth boundary.
37-53	BA	Very dark grayish brown (10YR3/2) silty clay loam, dark brown (10YR3/3) dry; moderate fine and medium subangular blocky structure; firm; common shiny surfaces on faces of peds; non-effervescent; clear smooth boundary.
53-129	Bt1	Dark yellowish brown (10YR4/4) silty clay; common fine distinct strong brown (7.5YR4/6) and few fine faint brownish yellow (10YR6/8) mottles; moderate medium subangular blocky structure; firm; common dark grayish brown (10YR4/2) coatings on ped faces and in root channels; thin discontinuous clay films on ped faces; few very fine ferromanganese concretions; noneffervescent; gradual smooth boundary.
129-165	Bt2	Dark yellowish brown (10YR4/4) silty clay; mottles as above; moderate medium and coarse blocky structure; very firm; common black (10YR2/1) coatings on ped faces and in root channels; thin discontinuous clay films on ped surfaces; few very fine ferromanganese concretions; common fine pores; noneffervescent clear smooth boundary.
165-182	BC	Dark yellowish brown (10YR4/4) heavy silt loam, yellowish brown (10YR5/4) to light yellowish brown (10YR6/4) dry, few fine faint strong brown (10YR5/8) mottles; moderate medium subangular blocky structure; firm; thin discontinuous clay films on ped surfaces; few fine ferromanganese concretions; common fine pores; black (10YR2/1) coatings in root channels; noneffervescent; gradual smooth boundary.
182-305	C	Color and mottling like above; loam; massive; common fine pores; common fine ferromanganese concretions; noneffervescent.

The absolute age of the T-2 fill at 14DO32 is not known. However, a radiocarbon date from the T-2 terrace at 14SH101 indicates that sediments in the upper two meters of the fill accumulated during the late Wisconsinan. Thus Paleoindian cultural materials may be deeply buried beneath the T-2 terrace at 14DO32, although such were not encountered in the excavation of Trench 1. Based on soils evidence, the T-2 terrace has been sufficiently stable since late Wisconsinan time and may therefore also have surface sites of Paleoindian and later periods.

1986 Investigations

The site was surveyed on July 25 and artifact concentrations were pin-flagged. At that time, the site area was in low milo and visibility was good (75%). The horizontal extent of the site was measured and determined to cover about 10,000 m^2. Artifacts were more frequently encountered in the eastern half of this area, including six chipped stone tools that were piece plotted (Fig. 6.11; Table 6.12). Datum was established on the eastern margin of the site and off the cultivated portion of the site. Seven test units were placed in areas of artifact concentration and, based on photographic documents of the 1966 excavations supplied by Dr. Alfred E. Johnson, in areas not previously investigated (cf. Figs. 6.10 and 6.11).

Table 6.12. Surface Artifacts from 14DO32 shown on Figure 6.11.

Artifact 1	1 Projectile Point (Fig. 6.6b [p. 69])
Artifact 2	1 Knife Fragment
Artifact 3	1 Projectile Point Base (Fig. 6.6c)
Artifact 4	1 Projectile Point (Fig. 6.6f)
Artifact 5	1 Knife Fragment
Artifact 6	1 Distal-Lateral Scraper (Fig. 6.6g)

Cultural material was recovered from all units but, without exception, it was confined to either the plow zone or to dessication cracks in the underlying Bt horizon that were filled with Ap horizon soil. Artifacts in dessication cracks were vertically oriented, reflecting their displacement from the upper level. The truncated and shallow nature of the features excavated in 1966 indicates the site at that time had already been disturbed by plowing. It now appears that, because of subsequent erosion caused by non-contour plowing of the site, the stratigraphic integrity of the cultural deposits has been lost.

Assemblage

The total artifact assemblage from the Anderson site consists of 12 formal chipped stone tools, 70 informal tools (i.e., retouched/ utilized flakes and shatter), 1,420 pieces of debitage, 33 potsherds (32 body sherds and one rim fragment), and one piece of unidentified bone (Table 6.13).

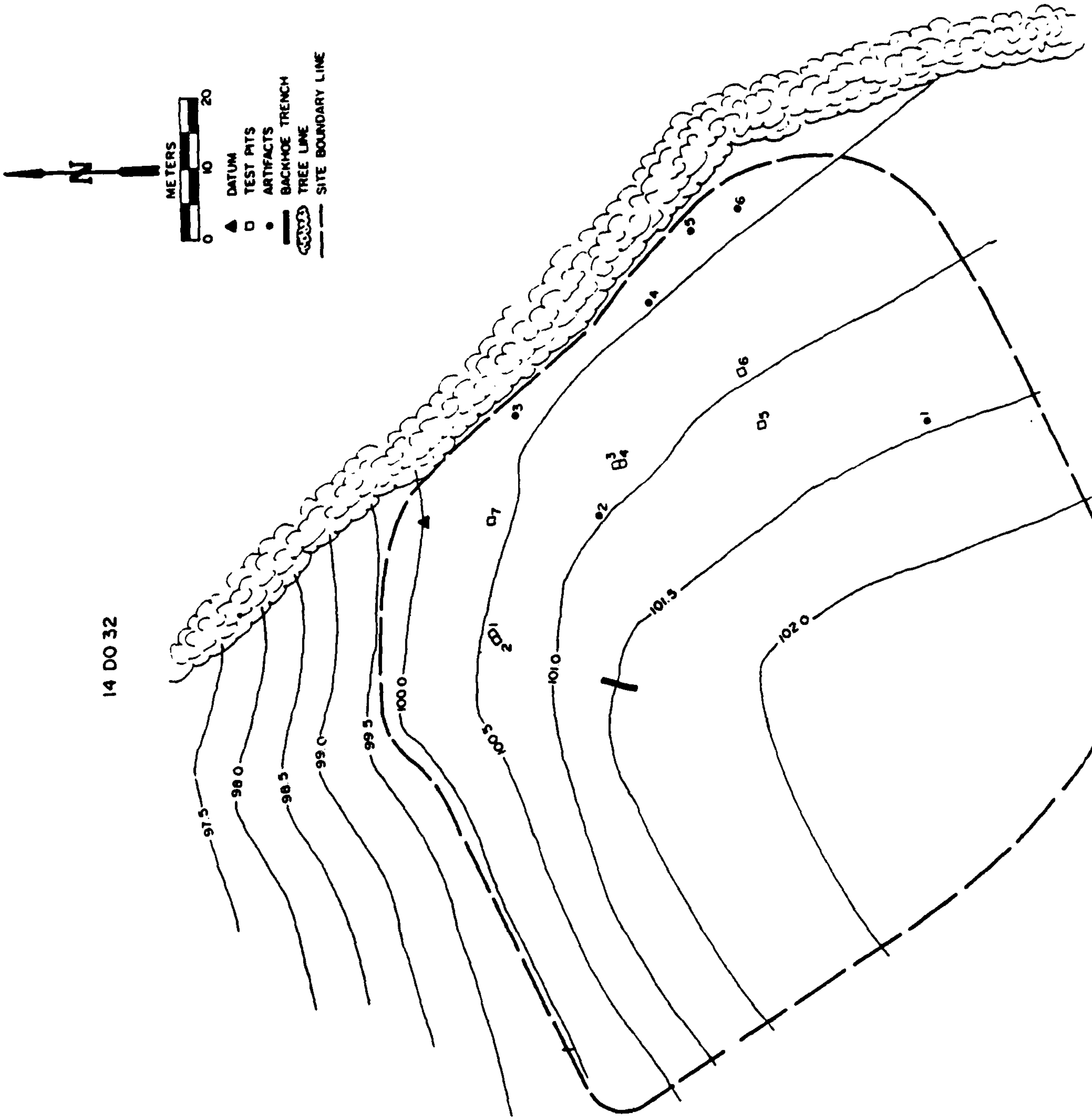


Figure 6.11. Map of 14DO32 showing location of surface finds, test units and backhoe trench. Compare with Figure 6.10.

Table 6.13. Cultural Material Recovered from 14DO32.

Test Unit Level (cm)	Sur- face	xu1 1 0-10	xu1 2 10-20	xu2 1 0-10	xu3 1 0-30
Sherds	-	7	-	3	11
Rim Sherds	-	-	-	1	-
Shatter		14	1	21	80
Flakes		48	3	86	211
Potlids		-	-	1	-
Proj. Pts.	3	1	-	-	-
Knife Frag.	2	-	-	1	-
Biface Frag.	-	-	-	-	2
D.-L. Scraper	1	-	-	-	-
Ret./Ut. Flake	-	-	-	2	5
Ret./Ut. Chip	-	-	-	-	1
Ret./Ut. Shatter	-	-	-	2	1
Fauna	-	1	-	-	-

Table 6.13. (cont').

Test Unit Level (cm)	xu3 2 30-40	xu4 1 0-19	xu5 1 0-25	xu6 1 0-17	xu7 1 0-16
Sherds	-	4	1	3	3
Shatter	-	61	36	55	73
Flakes	6	165	122	194	236
Potlids	-	1	1	2	1
Cores	-	-	-	1	-
Tested Matl.	-	-	1	-	-
Proj. Pts.	-	-	-	-	1
Biface Frag.	-	-	-	-	1
Notch/Flake	-	-	-	-	1
Ret./Ut. Flake	-	5	8	21	21
Ret./Ut. Flake/Chip	-	-	1	-	-
Ret./Ut. Chip	-	-	-	1	2
Ret./Ut. Blade	-	-	1	-	2
Ret./Ut. Shatter	-	2	2	-	1

The chipped stone tools in the assemblage are consistent with either a Plains Woodland or Plains Village affiliation. In addition to the large and small corner-notched projectile points found on the surface, a large expanding-stemmed point was recovered from the plow zone in Unit 1 (Fig. 6.6i [p. 69]). The ceramic material (which includes only four analyzable

sherds, see chapter 8) is reflective of a Pomona variant occupation. In order to support or refine the temporal assignment of the Pomona occupation a sample of charcoal from Feature 5 (Johnson 1968:32, 34) was submitted for radiocarbon analysis. This feature, a storage pit, was located on the periphery of the structure and had been partially disturbed by one of the postmolds of it. This suggests that the feature pre-dates the structure and, it is assumed, the intramural features associated with it. Recall, one of the intramural features (Feature 6) had been radiocarbon dated to A.D. 1000. The date obtained from Feature 5, 1090±50 B.P.: A.D. 860 (Beta-18611), is earlier but still within the range of the Pomona variant (Brown 1985).

Interpretation

Based on the data recovered in 1966, the Anderson site was occupied during both the Deer Creek phase of the Plains Woodland period and the Pomona variant of the Plains Village period. While material recovered in 1986 largely confirms this finding, it is also relatively meager by comparison. The 1986 assemblage reflects such activities as lithic tool production and maintenance, hunting, hide processing, and food preparation/storage. Without the prior data base from the 1966 investigation, this assemblage could easily be interpreted as indicative of a short-term encampment at the site. However, the structural evidence and storage features uncovered in 1966 reflect a longer occupancy during the Plains Village period. Moreover, the radiocarbon dates discussed above suggest the site was periodically reoccupied during the Plains Village period.

Recommendations

Despite thorough testing in areas not previously excavated, no intact cultural deposits were discovered at the site. Moreover, in comparison to the amount of material recovered in 1966, the 1986 assemblage is small. The geomorphic setting is not conducive to the burial of late prehistoric sites and, indeed, the terrace on which the site is located has been subject to severe erosion. Consequently, the deposits have been vulnerable to agricultural disturbance and their integrity destroyed. While the potential for deep burial of older prehistoric sites, such as Paleoindian occupations, exists in the site area, deep trenching did not expose any cultural remains. Therefore, the site is not considered to be eligible for the National Register.

14DO35

Name: Stull Site — **Recorded:** KU, 1965
Cultural Affiliation: Archaic?, Plains Woodland, Plains Village
Topographic Setting: T-2 Terrace — **Elevation:** 277m msl
Parent Material: Alluvium — **Slope:** 1-2%
Drainage: Deer Creek

Previous Research

The original survey of this site by the University of Kansas in 1965 resulted in recovery of a large quantity of lithic material, including blade fragments, utilized flakes, debitage, and chipped stone tools. Projectile points found were suggested to indicate Archaic, Woodland and Central Plains Tradition affiliations (Chism 1966:17-18). A private collection from the site was described as containing contracting-stemmed projectile points, large and small corner-notched points, small triangular unnotched points, and alternately beveled knives. The suggested temporal range is certainly plausible given this variety of point styles. Interestingly, no ceramic material was recovered to support the suggested Woodland and/or Central Plains affiliations.

The site was tested by the University of Kansas in 1966 (Johnson 1968:111-115). These investigations included excavation on both sides of the unnamed tributary of Deer Creek that marks the western boundary of the site. Two buried components were thus discovered, one at 75 cm below surface and another at two meters below surface. The latter contained evidence of a hearth but neither diagnostic artifacts nor radiocarbon dates were obtained from either component. Excavations in the major portion of the site to the east of the stream could not be conducted because of potential crop damage. The recovered artifact assemblage consisted of two projectile points, eight knife fragments, two end and side scrapers, 20 retouched flakes, a mano, seven hammerstones, two hammerstone fragments, and only seven small pieces of pottery. On the basis of the ceramic assemblage, the site was assigned to the Central Plains "phase" (Johnson 1968:129).

Geomorphic Setting

Site 14DO35 is located on the T-2 terrace in Deer Creek Valley. The site is at an elevation of approximately 274 to 280 meters msl. The southern boundary of 14DO35 is situated along the short steeply sloping scarp that separates the T-2 fill from the lower T-Ob fill. Erosion along the scarp has exposed the Bt horizon of the T-2 soil.

The soil at 14DO35 is mapped as the Martin silty clay loam in the <u>Soil Survey of Douglas County, Kansas</u> (Dickey et al. 1977). However, like the soil at 14DO32, the one at 14DO35 has not developed in residuum derived from shale. Instead, the soil has formed on the surface of a four-meter-thick alluvial fill that overlies a bedrock strath surface. Table 6.14 provides a detailed description of the soil profile exposed in Trench 1. The soil is characterized by a thin silt loam Ap horizon that overlies a silty clay loam BA horizon. The BA horizon gradually gives way to thick dark yellow brown, silty clay Bt horizon. The argillic horizon has strong structural development and continuous clay films on ped surfaces. Yellowish red mottles are common throughout the subsoil. Although bedrock was not reached

Table 6.14. Description of Soil Profile in Trench 1 at 14DO35.

Depth (cm)	Soil Horizon	Description
0-21	Ap	Very dark grayish brown (10YR3/2) silt loam, dark grayish brown (10YR4/2 dry; weak medium and fine granular structure; friable; noneffervescent; abrupt smooth boundary.
21-30	BA	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate fine and medium subangular blocky structure; firm; shiny surfaces on ped faces; few thin discontinuous clay films on ped surfaces; common fine pores; noneffervescent; gradual smooth boundary.
30-31	Bt1	Dark yellowish brown (10YR4/4) silty clay loam, few fine faint yellowish red (5YR4/6) mottles; moderate medium angular and subangular blocky structure; very firm; common very dark gray brown (10YR3/2) and dark brown (10YR3/3) coatings on ped surfaces; few fine ferromanganese concretions; thin continuous clay films on peds; black (10YR2/1) coatings in root channels; common fine pores; noneffervescent; gradual smooth boundary.
51-154	Bt2	Dark yellowish brown (10YR4/4) silty clay; many coarse distinct yellowish red (5YR4/6) mottles; moderate medium and coarse angular blocky structure; very firm; common fine ferromanganese concretions; thin continuous clay films on peds; common fine pores; noneffervescent; gradual smooth boundary.
154-304	Bt3	Dark yellowish brown (10YR4/6) silty clay loam, yellowish brown (10YR5/6) dry; common fine and medium distinct yellowish red (5YR4/6) mottles; weak coarse and medium angular and subangular blocky structure; very firm; thin discontinuous clay films on ped surfaces; common fine ferromanganese concretions; black (10YR2/1) coatings in root channels; common fine pores; noneffervescent; gradual smooth boundary.
304-330	BC	Color like above; loam; mottling like above; weak medium angular and subangular blocky structure; firm; shiny surfaces on some peds; common fine ferromanganese concretions; common fine pores; noneffervescent.

in the backhoe trench, shale outcrops at a depth of about four meters in a cutbank along the eastern boundary of the site.

Although soil erosion has been controlled over all but the southern edge of 14DO35, the land surface has been drastically disturbed by the construction of embankments designed to intercept *runoff*. Thus, cultural materials on the T-2 surface are not likely to be found in situ. However, as noted in the discussion for 14DO32, Paleoindian cultural materials may be deeply buried beneath the T-2 surface. Soil evidence at 14DO35 indicates that the T-2 terrace has been sufficiently stable since late Wisconsinan time and may therefore have evidence of Paleoindian and later cultural periods on its surface. However, neither survey of the stream banks nor inspection of the walls of Trench 1 succeeded in finding buried cultural materials.

1986 Investigations

Investigations at 14DO35 began on July 9 with a pedestrian reconnaissance that identified a concentration of lithic debris and tools above a terrace scarp. The site was in milo, but visibility ranged up to 100% between rows. Debitage continued to be noted below the terrace scarp, but in decreasing frequency. The site area was estimated to cover 7,200 m^2. The datum and 12 test units were established with the majority of units on the terrace proper (Fig. 6.12), as artifacts below the scarp seemed to indicate redeposition by sheet wash. A total of eight surface finds was plotted at this time (Table 6.15).

Dr. Alfred E. Johnson, who directed the excavations at 14DO35 in 1966, visited the site on July 21 in order to relocate the buried components noted during that prior investigation. However, the terrain had experienced such radical change in terms of vegetation growth along the stream and slumping of the banks that he was unable to find them.

Excavation began on July 10 and was completed July 14 and 15. Test Units 1, 2, 3 and 4 were in a grass strip next to the field and were dug in 10 cm levels. A plow zone was not immediately apparent, but prior cultivation was indicated by the presence of brome grass, an introduced species. Prehistoric artifacts were prevalent throughout all levels in these four units, and historic artifacts appeared as deep as 20 cm below surface. Examination of a wall profile in Units 1 and 2 indicated a plow zone boundary at 30 cm below surface. Units 5 through 10 were on top of the terrace and in the milo field, and were therefore begun with a 0-20 cm level. Artifacts were prevalent but decreased in frequency in this first level. Level 2 (20-30 cm below surface) in these six units showed a radical decrease in artifact density. Units 11 and 12 were below the terrace scarp, and showed the same pattern as above, but *did not* yield as many artifacts (Table 6.16).

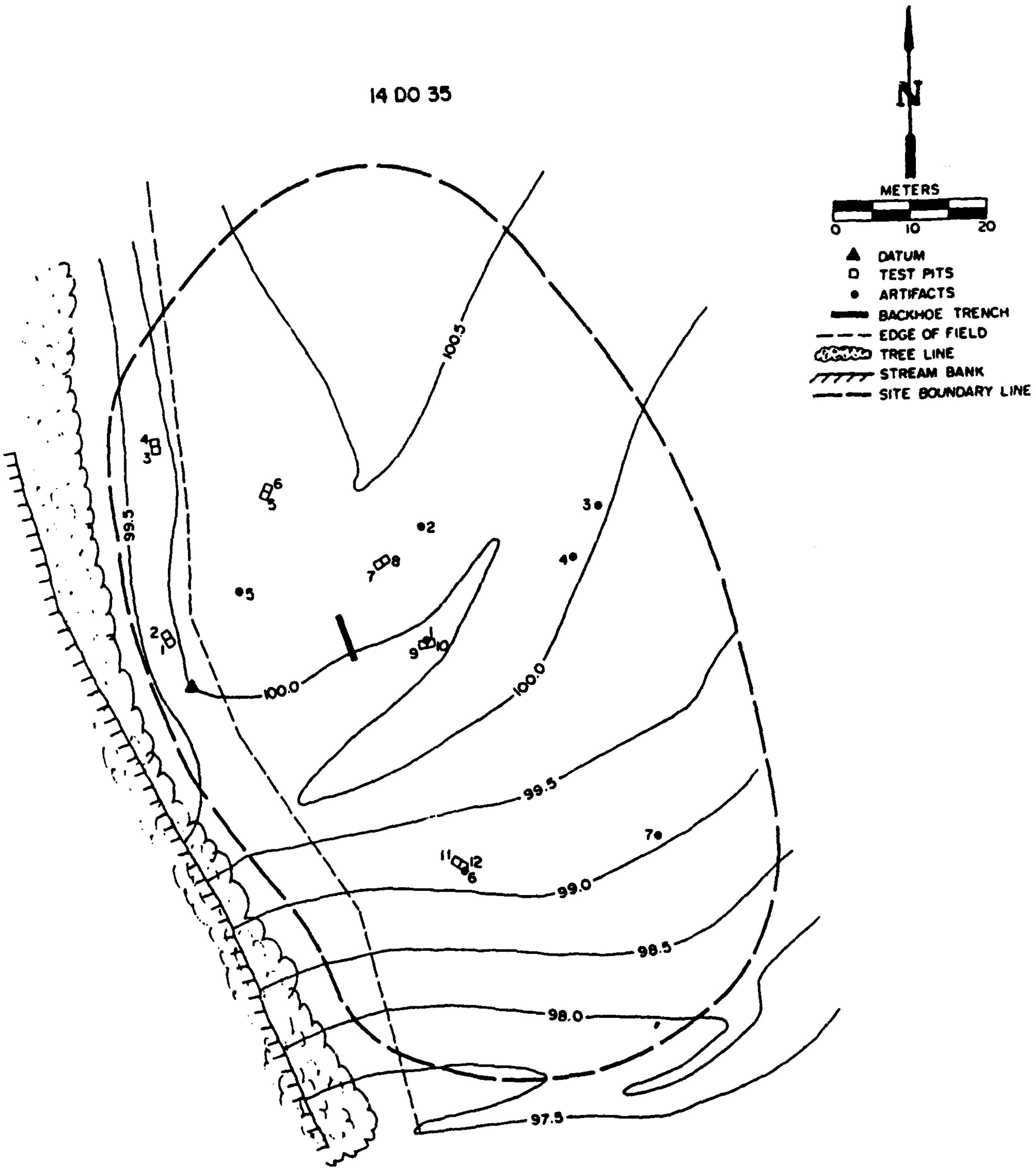


Figure 6.12. Map of 14DO35 showing location of surface finds, test units and backhoe trench.

Table 6.15. Surface Artifacts from 14DO35 shown on Figure 6.12.

Artifact 1	2 Projectile Points (Fig. 6.13a-b)
Artifact 2	1 Projectile Point (Fig. 6.13c)
Artifact 3	1 Projectile Point (Fig. 6.6h [p. 69])
Artifact 4	1 Hammerstone
Artifact 5	1 Hammerstone
Artifact 6	1 Abrader
Artifact 7	1 Biface Fragment

Table 6.16. Cultural Material Recovered from 14DO35.

Test Unit		xu1	xu1	xu1	xu2
Level	Sur-	1	2	3	1
(cm)	face	0-10	10-20	20-30	0-10
Shatter		49	56	32	39
Flakes		86	130	94	86
Potlids		1	3	1	-
Cores	-	1	1	1	-
Proj. Pts.	4	-	-	-	-
Biface Frag.	1	1	1	1	-
Graver	-	1	1	-	-
Ret./Ut. Flake	-	2	2	3	4
Ret./Ut. Blade	-	-	1	-	-
Ret./Ut. Core	-	-	-	-	1
Ret./Ut. Core Frag.	-	-	1	1	-
Hammerstone	2	-	-	-	-
Abrader	1	-	-	-	-

Table 6.16. (cont').

Test Unit	xu2	xu2	xu2	xu3	xu3	xu4
Level	2	3	Auger	1	2	1
(cm)	20-30	30-40	80	0-30	30-40	0-30
Sherds	-	-	-	1	-	19
Shatter	13	12	-	83	5	94
Flakes	53	29	1	143	10	277
Potlids	-	1	-	2	-	1
Cores	-	-	-	-	1	-
Tested Matl.	-	-	-	-	-	2
Biface Frag.	-	-	-	-	-	4
Graver	-	1	-	-	-	-
Uniface Frag.	-	-	-	-	-	1
Notch/Flake	-	-	-	-	-	1
Ret./Ut. Flake	3	1	-	8	-	6

Table 6.16. (cont').

Test Unit Level (cm)	xu2 2 20-30	xu2 3 30-40	xu2 Auger 80	xu3 1 0-30	xu3 2 30-40	xu4 1 0-30
Ret./Ut. Chip	-	-	-	2	-	-
Ret./Ut. Blade	1	-	-	-	-	2
Ret./Ut. Shatter	2	-	-	3	-	1
Fauna	-	-	-	-	-	3

Table 6.16. (cont').

Test Unit Level (cm)	xu5 1 0-25	xu6 1 0-25	xu6 2 25-35	xu7 1 0-20	xu8 1 0-20	xu8 2 20-30
Sherds	5	-	-	1	-	-
Shatter	136	94	1	149	156	3
Flakes	200	211	1	349	296	3
Potlids	1	-	-	1	3	-
Cores	1	-	-	-	-	-
Knife Frag.	-	-	-	1	-	-
Biface	-	-	-	2	-	-
Biface Frag.	2	1	-	2	-	2
End Scraper	-	1	-	-	-	-
D.L. Scraper	1	-	-	-	-	-
Notch/Flake	1	1	-	1	1	-
Notch/Ut. Shatter	-	-	-	-	1	-
Notch/Ut. Flake	-	-	-	-	1	-
Ret./Ut. Flake	12	8	-	3	7	-
Ret./Ut. Flake/Chip	-	-	-	1	-	-
Ret./Ut. Chip	-	1	-	-	-	-
Ret./Ut. Blade	1	-	-	-	-	-
Ret./Ut. Shatter	6	2	-	-	1	-
Ret./Ut. Core Frag.	1	-	-	-	-	-
Mano	-	1	-	-	-	-

Table 6.16. (cont').

Test Unit Level (cm)	xu9 1 0-20	xu9 2 20-30	xu10 1 0-20	xu11 1 0-20	xu12 1 0-20	xu12 2 20-30
Sherds	2	-	1	5	1	-
Shatter	136	3	117	51	28	-
Flakes	360	8	298	138	70	1
Potlids	1	-	3	1	-	-
Knife Frag.	1	-	-	-	-	-
Biface Frag.	1	-	-	1	1	-
Uniface Frag.	-	-	2	-	-	-
Notch/Flake	3	-	-	-	-	-
Notch/Ut. Flake	-	-	-	1	-	-
Ret./Ut. Flake	11	-	4	2	3	-
Ret./Ut. Chip	-	-	1	-	-	-
Ret./Ut. Blade	-	-	-	-	2	-
Ret./Ut. Shatter	1	-	-	1	1	-
Ret./Ut. Chunk	1	-	-	1	-	-
Hammerstone	-	-	-	1	-	-

Assemblage

A large lithic sample of 4292 pieces was taken from 14DO35, consisting of 4127 pieces of debitage (96%) and 165 tools (4%). Lithic tools are represented by 126 informal tools, 34 formal chipped stone tools, and five non-chipped stone tools (three hammerstones, one mano and one abrader). Diagnostic chipped stone tools were limited to the projectile points noted in Table 6.15. These four surface finds include one stemmed point, two unnotched points and one side-notched point, the latter three suggestive of Plains Village. Although the ceramic sample consisted of 35 sherds, none were large enough for analysis. Fifty pieces of burned limestone weighing 244.5 gms was recovered. Faunal remains are gastropod shell and may be recent intrusions.

Historic debris (Appendix 1) includes fragments of bottle glass, wire and square nails, portions of a water pipe, pieces of clinker and coal, wire, a staple, and a single .22 caliber cartridge.

Interpretations

The quantity of lithic material and the hammerstones indicate tool production, while the abrader may have been used for either wood or stone. Projectile points and scrapers suggest hunting activities, although the site was probably used by more than just a small hunting party, if the mano (indicative of plant food processing) and pottery belongs to the same occupation. Occupation during the Plains Village period is evidenced

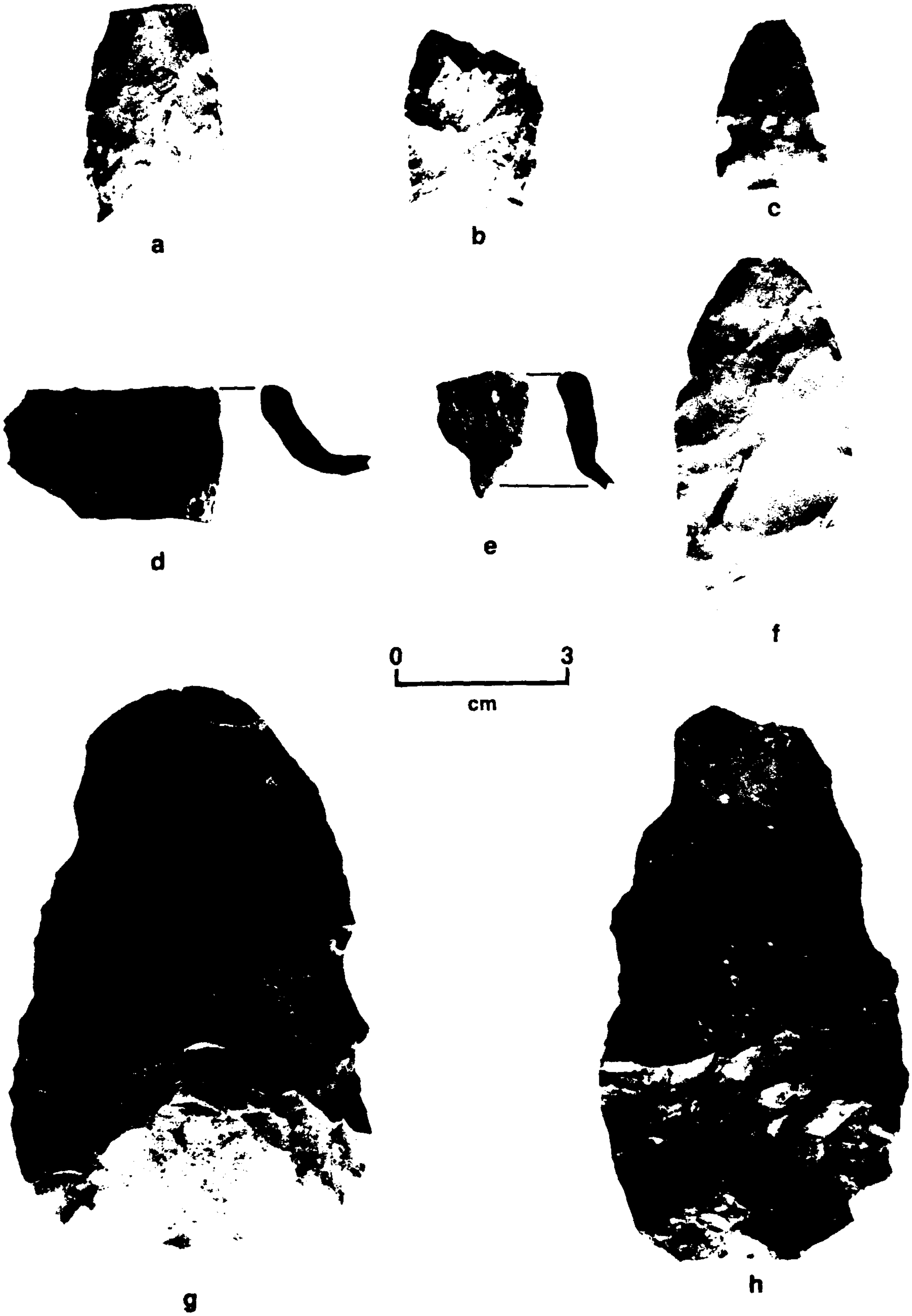


Figure 6.13. Selected artifacts from 14DO35, 14DO39, 14DO61, and 14DO62. a) unnotched projectile point, DO35860001 b) unnotched projectile point, DO35860002 c) side-notched arrow point, DO35860003 d) rim sherd, DO3939860327 e) rim sherd, DO39860364 f) Knife with hafting element missing, DO61860001 g) bifacial hoe, DO62860204 h) biface (preform?), DO62860001. Right side of rim sherd profiles is outside.

by the small notched and unnotched points. Earlier occupations are possible, based on the presence of a stemmed projectile point, although the point may belong to the Plains Village period also (see chapter 7). The historic debris may represent the remains of a recent farmstead or, equally likely, the activities of residents at the town of Stull, which is adjacent to the site.

Unfortunately, most of the site appears to be within the plow zone and has suffered destruction through cultivation. The test units outside the field showed deeper deposits, but this is likely due to soil build-up from furrows at the edge of the field. Historic debris at 20 cm below surface supports this contention.

Recommendations

Although the site contains an abundance of lithic materials that represent at least two and possibly three prehistoric periods, this material has suffered immeasurable damage because of agricultural practices. Both plowing and artificial terracing of the site area has destroyed whatever integrity the site once possessed. Despite stream bank inspection and deep trenching of the site, no buried cultural materials were discovered. On the basis of the 1986 investigations, the site does not appear to be significant. No recommendation for National Register consideration is warranted.

14DO37

Name: Unnamed **Recorded:** KU, 1965
Cultural Affiliation: Archaic (?), Plains Woodland, Plains Village
Topographic Setting: T-2 Terrace **Elevation:** 97.5 m MSL
Parent Material: Alluvium **Slope:** 2%
Drainage: Deer Creek

Previous Investigations

This site's only prior investigation by professional archaeologists occurred in 1965, when the University of Kansas conducted a survey (Chism 1966:18-19). The survey resulted in recovery of lithic debris and tool fragments, including a fragment of a Plains Village projectile point. According to Chism (1966), a private collection from the site contained projectile points of the Archaic and Woodland periods.

Geomorphic Setting

Site 14DO37 is located on the T-2 terrace in Deer Creek valley. The site is at an elevation of approximately 98.0 to 100.5 m msl. The southern half of the site is situated on a long, gently sloping scarp separating the T-2 fill from the lower T-0b fill.

The strongly developed T-2 soil observed on the east side of Deer Creek at 14DO35 also occurs at 14DO37. Table 6.17 provides a detailed description of the soil profile exposed in Trench 1.

Table 6.17. Description of a Soil Profile in Trench 1 at 14DO37.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark brown (10YR2/2) silt loam, dark brown (10YR3/3) dry; weak medium and fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-30	BA	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; moderate fine and medium angular and subangular blocky structure; firm; shiny surfaces on ped faces; few thin discontinuous clay films on peds; common fine pores; noneffervescent; gradual smooth boundary.
30-96	Bt1	Dark brown (10YR3/3) silty clay loam; moderate medium angular and subangular blocky structure; very firm; common dark brown (10YR3/3) coatings on ped surfaces; thin discontinuous clay films on peds; common fine pores; noneffervescent; gradual smooth boundary.
96-198	Bt2	Dark yellowish brown (10YR3/4) silty clay, dark yellowish brown (10YR4/4) dry; moderate medium coarse angular blocky structure; very firm; thin discontinuous clay films on peds; very dark grayish brown (10YR3/2) coatings in root channels and on some ped faces; common fine pores; non-effervescent; gradual smooth boundary.
198-208	BC	Color like above; light silty clay loam; weak medium angular and subangular blocky structure; firm; shiny surfaces on some ped faces; very dark grayish brown (10YR3/2) coatings in root channels and on some ped faces; common fine pores; non-effervescent; clear smooth boundary.
208-238	C	Yellowish brown (10YR5/8) loam; common coarse dark yellowish brown (10YR4/4) mottles; few fine distinct yellowish brown (5YR4/6) mottles; massive; noneffervescent; few weathered shale fragments in lower 5 cm.
238		Shale.

The soil is characterized by a thick, dark brown to dark yellowish brown, silty clay Bt horizon. The C horizon is yellowish brown and is formed in loamy alluvium overlying a bedrock strath surface.

Three bedrock trenches were excavated on the broad T-0b surface adjacent to 14DO37 in order to determine whether the site extends out onto the floodplain and to access the potential for buried cultural materials in the T-0b fill. The soil on the T-0b surface adjacent to 14DO37 is the Kennebec silt loam. This weakly developed soil is characterized by a thick silt loam A horizon overlying a massive silty clay loam C horizon. Depth to bedrock ranged from 2.41 meters in Trench 4 to 1.52 meters in Trench 2. There was no evidence of cultural materials or paleosols in the T-0b fill.

Based on the soil-geomorphic evidence from Trenches 2, 3 and 4, there is low potential for buried archaeological sites in the T-0b fill adjacent to 14DO37. Furthermore, the site does not appear to extend out onto the T-0b surface. However, as noted in the discussions for 14DO32 and 14DO35, Paleoindian cultural materials may be deeply buried beneath the T-2 surface at 14DO37. Soil evidence indicates that the T-2 surface has been sufficiently stable since late Wisconsin time and may therefore have evidence of Paleoindian and later cultural periods on its surface.

1986 Investigations

14DO37 is situated near the Deister Farm, a farmstead on the National Register of Historic Places and currently leased to the Kansas State Fish and Game Commission (Chambers et al. 1977: 187). The site was investigated on July 9, 16 and 17, and was partially planted in corn at the time, while the remainder of the site is a grass field access road (Fig. 6.14). Visibility was between 60 and 80% in the cornfield, and from 0% to 10% along the road. A pedestrian reconnaissance determined a site area of approximately 7800 square meters, based on a surface scatter of debitage (which included one biface plotted in by transit). Seven test units were placed in the central area of the site (Test Unit 1 was deleted due to an authorized change in research strategy). Plow zones were removed as one level, and varied in depth from 8 cm below surface to 25 cm below surface. Units 7 and 8 were adjacent excavations at the edge of the field, and displayed evidence of erosion. Plow zone was only 8 to 10 cm below surface in these two units, showing a distinct change in soil horizons and a culturally sterile Level 2.

Units 3 and 4, also adjacent units at the edge of the field, displayed the deepest plow zone (25 cm below surface). The position at the field's edge and its proximity to a recent trash mound suggests recent deposition (especially as historic material was found in the lower portions of Unit 3, Level 1), and may be due to agricultural practices or maintainence of the

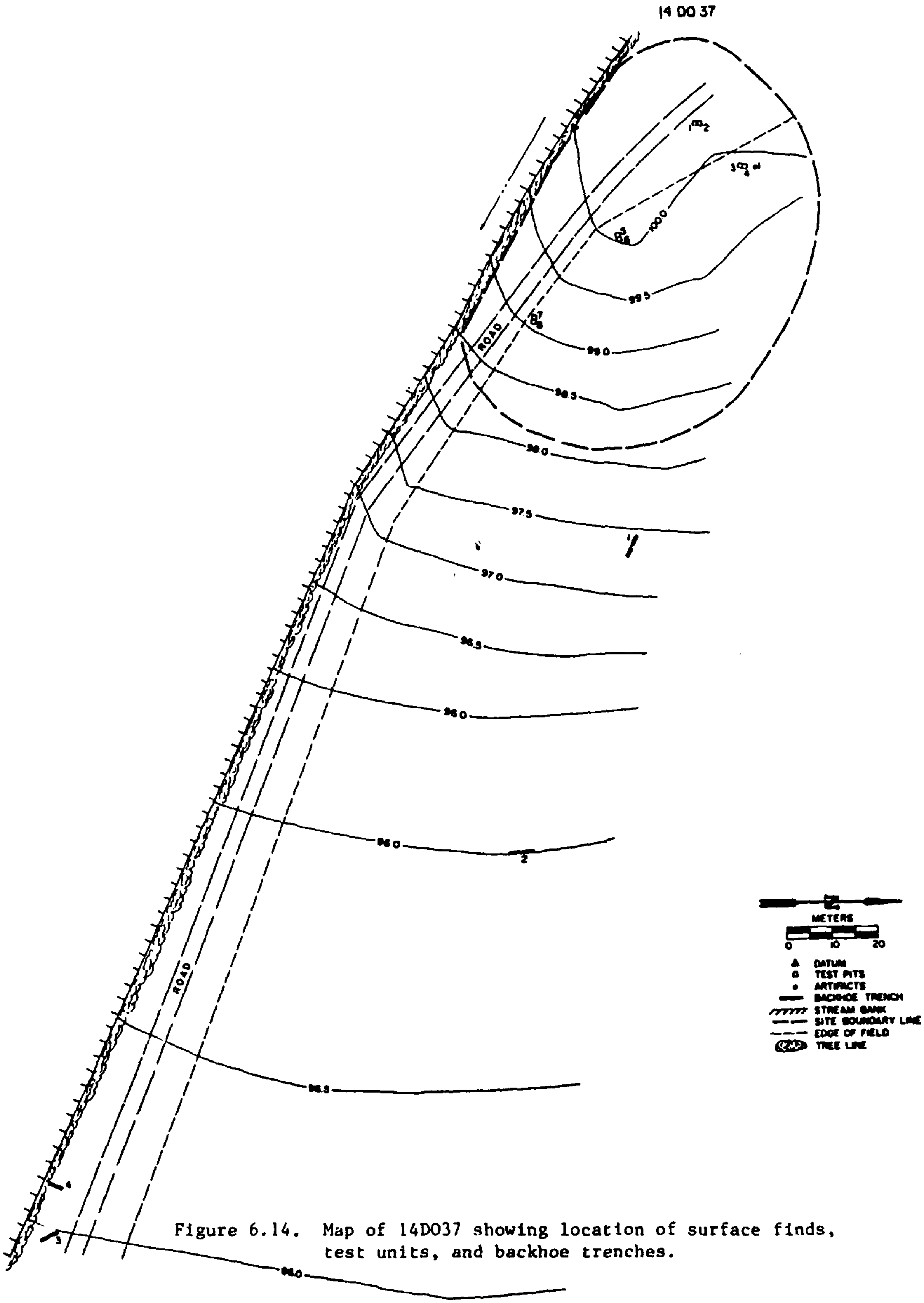


Figure 6.14. Map of 14DO37 showing location of surface finds, test units, and backhoe trenches.

Deister Farmstead. Also present at 35 cm below surface in Unit 2 was acrotovina containing two flakes in situ. All units, however, showed the highest concentration of artifacts in the upper 0 to 20 cm. Natural chert pebbles were common throughout the excavations.

Assemblage

The artifact assemblage from excavations at 14DO37 consisted entirely of lithic material (Table 6.18). Of a total sample of 537 pieces, 30 are tools (6%). Formal tools are limited to seven bifacial implements. A quantity of burned limestone (415.5 grams total) was found in Level 1 of all the excavations except Units 7 and 8. Historic material was prevalent, not surprisingly, due to the proximity of the site to the farmstead.

Table 6.18. Cultural Material Recovered from 14DO37.

Test Unit	xu2	xu2	xu3	xu3	xu4	xu4
Level	1	2	1	2	1A	1B
(cm)	0-25	25-35	0-40	40-50	0-20	20-40
Shatter	23	-	12	1	9	2
Flakes	100	9	66	4	40	9
Biface	-	-	-	-	1	-
Biface Frag.	2	1	-	-	1	-
Notch/Flake	1	-	1	-	-	-
Ret./Ut. Flake	4	-	2	-	6	-
Ret./Ut. Blade	-	-	-	-	-	1
Hammerstone	-	-	-	-	-	1

Table 6.18. (cont').

Test Unit	xu5	xu5	xu6	xu7	xu7	xu8
Level	1	2	1	1	2	1
(cm)	0-25	25-35	0-25	0-10	10-20	0-8
Shatter	25	3	24	9	-	13
Flakes	67	1	40	24	-	23
Biface Frag.	1	-	-	-	-	-
Notch/Flake	-	-	-	1	-	-
Notch/ Ut. Shatter	-	-	1	-	-	-
Ret./Ut. Flake	-	-	6	1	-	-

Interpretations

Although previous collections from 14DO37 indicate occupation

by Archaic, Plains Woodland, and Plains Village groups, diagnostic artifacts were not found during the 1986 investigations. As noted in chapter 7, tool production is indicated for site activity. The presence of burned limestone suggests the possibility of prehistoric hearths. In light of the probable cultural affiliations, the lack of ceramics suggests short-term occupations. Since the site is on a stable surface and artifacts are concentrated in the upper 20 cm, agriculture has probably destroyed the integrity of the site.

Recommendations

Given the shallow cultural deposits at this site and the general lack of diagnostic artifacts, it is suggested that this site does not warrant further consideration for the National Register.

14DO39

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Pomona
Topographic Setting: T-1 terrace
Elevation: 268-271m msl
Parent Material: Alluvium
Slope: <1%
Drainage: Deer Creek

Previous Investigations

This site was first investigated by the University of Kansas in 1965. At that time it was surveyed and a small sample of lithic and ceramic artifacts was collected. This material included two blade fragments, two unfinished points, a utilized flake, some debitage, and ten potsherds. The latter were described as indicative of a Woodland occupation, but the temper of these artifacts is more definitive of a Pomona affiliation.

Geomorphic Setting

Site 14DO39 is located on the T-1 terrace in Deer Creek valley at an elevation of approximately 268 to 271 meters msl. The soil at 14DO39 is the Reading silt loam. This soil is a mollisol formed in loamy alluvium on a nearly level surface. Table 6.19 provides a detailed description of the soil profile exposed in Trench 1. A thin, silty Ap horizon overlies an 18 cm thick silty loam BA horizon. The BA horizon gradually gives way to a strongly developed Bt horizon at a depth of 33 cm. The argillic horizon ranges from dark brown to dark yellowish brown silty clay loam, and is characterized by medium subangular blocky structure. Thin continuous clay films are common on the surfaces of peds throughout most of the subsoil. The Bt horizon is 2.05 meters thick, and it gradually gives way to a yellowish brown silt loam C horizon.

The age of the T-1 fill at 14DO39 is not known. However, based on radiocarbon dates and archaeological evidence from

other sites in the Wakarusa River drainage system, the T-1 surface began to stabilize around 3000 years ago. Thus, evidence for late Archaic and later cultural periods may be on or at shallow depths below the T-1 surface at 14DO39.

Table 6.19. Description of Soil Profile in Trench 1 at 14DO39.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) heavy silt loam, brown (10YR4/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-33	BA	Very dark gray (10YR3/1) silty clay loam, very dark grayish brown (10YR3/2) dry; moderate fine subangular blocky structure; firm; noneffervescent; gradual smooth boundary.
33-77	Bt1	Dark brown (10YR3/3) heavy silty clay loam, brown (10YR4/3) dry; moderate medium subangular blocky structure; firm; shiny surfaces on many ped faces; thin continuous clay films; noneffervescent; gradual smooth boundary.
71-200	Bt2	Dark brown (10YR3/3) heavy silty clay loam, brown (10YR4/3) dry; moderate medium subangular blocky structure; firm; shiny surfaces on many ped faces; thin continuous clay films; few fine pores; noneffervescent; gradual smooth boundary.
200-238	Bt3	Dark yellowish brown (10YR4/4) silty clay loam; moderate fine subangular blocky structure; firm; thin discontinuous clay films; common fine pores; noneffervescent; clear smooth boundary.
238-251	BC	Yellowish brown (10YR5/4) silt loam, dark yellowish brown (10YR3/4) dry; weak fine subangular blocky structure; firm; many fine pores; noneffervescent; gradual smooth boundary.
251-267+	C	Yellowish brown (10YR5/4) silt loam, dark yellowish brown (10YR3/4) dry; massive; firm; many fine pores; noneffervescent.

1986 Investigations

14DO39 is on a terrace close to Deer Creek and in the vicinity of the Anderson Site (14DO32). The site was investigated on July 25, 28 and 29 while the field was in milo. Visibility

was between 40% and 60%, and a pedestrian reconnaissance located clusters of debitage and two potsherds in a site area of approximately 4700 square meters (Fig. 6.15). Four test units were placed within the artifact clusters.

As the site is in an alluvial setting, the plow zone was difficult to distinguish, so excavation was done in 10 cm levels. Test Units 1 and 2 displayed relatively loose soils and a quantity of artifacts, which decreased in density after 20 cm below surface. By Level 4 (30-40 cm below surface), artifact density was at two pieces of debitage in each of the units. Units 3 and 4 were in an area of sheet wash and displayed hard, compacted soils. Artifact density in these two units was considerably less than in the previous two test units. Level 3 (20-30 cm below surface) of Unit 3 yielded only two artifacts and was culturally sterile in Level 4, so Unit 4 was abandoned at 20 cm below surface. Soil in Unit 3 became looser in Level 4 (30-40 cm below surface), which suggests compaction of the upper horizons by agricultural equipment.

Assemblage

The prehistoric artifact assemblage from 14DO39 included both ceramics and lithics (Table 6.20). Sixteen tools form 4.6% of the total lithic sample of 349 pieces. Culturally diagnostic lithic material is absent, as it was in the previous investigation (Chism 1966: 19). The ceramic sample of 66 sherds yielded 15 analyzable sherds, and includes two rim sherds belonging to the Pomona variant (Fig. 6.13d-e [p. 91]). The sample shows a variety in temper, surface treatment and color, and represents a number of vessels (see chapter 8). Burned limestone, burned earth and charcoal was present in very small quantities.

Table 6.20. Cultural Material Recovered from 14DO39.

Test Unit Level (cm)	Surface	xul 1 0-10	xul 2 10-20	xul 3 20-30	xul 4 30-40	xul 5 40-50
Sherds	2	22	7	5	-	-
Rim Sherds	-	1	-	-	-	-
Shatter		10	4	-	-	1
Flakes		59	57	17	2	-
Potlids		1	-	-	-	-
Cores	-	-	1	-	-	-
Ret./Ut. Flake	-	-	1	-	-	-
Ret./Ut. Flake/Chip	-	-	1	-	-	-
Ret./Ut. Chip	-	-	1	-	-	-
Ret./Ut. Shatter	-	-	1	-	-	-
Ret./Ut. Core	-	-	1	-	-	-

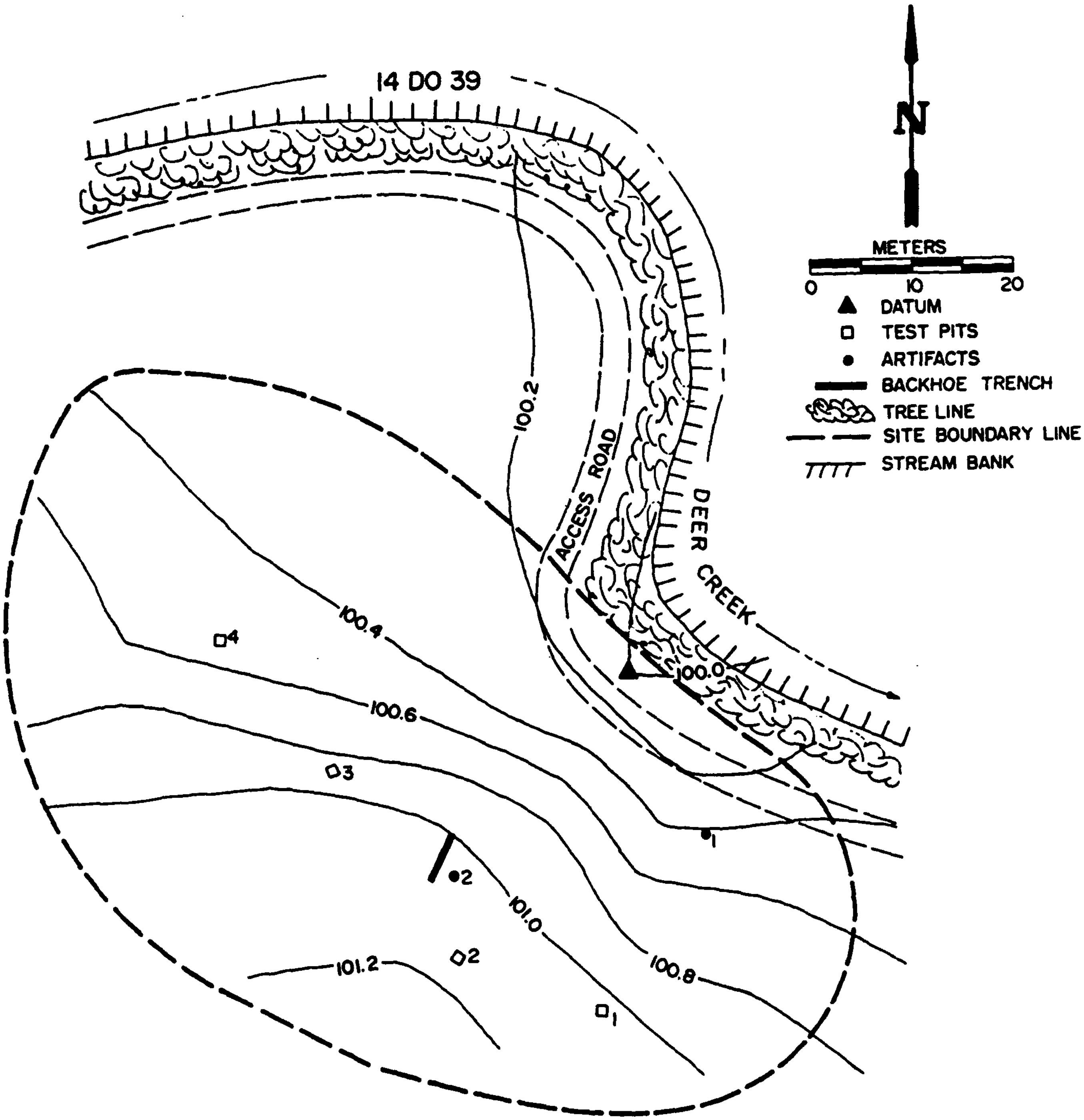


Figure 6.15. Map of 14DO39 showing location of surface finds, test units and backhoe trench.

Table 6.20. (cont').

Test Unit Level (cm)	xu2 1 0-10	xu2 2 10-20	xu2 3 20-30	xu2 4 30-40
Sherds	8	6	10	-
Rim Sherds	-	1	1	-
Shatter	6	5	6	-
Flakes	64	37	22	2
Potlids	-	-	1	-
Graver	-	1	-	-
End Scraper	-	1	-	-
Notch/Flake	-	-	1	-
Notch/Ut. Flake	-	-	-	1
Ret./Ut. Flake	-	2	2	1
Ret./Ut. Blade	-	-	1	-

Table 6.20. (cont')

Test Unit Level (cm)	xu3 1 0-10	xu3 2 10-20	xu3 3 20-30	xu3 4 30-40	xu4 1 0-10	xu4 2 10-20
Sherds	2	1	-	-	-	-
Shatter	2	1	-	-	-	1
Flakes	10	11	2	-	-	1
Ret./Ut. Flake	-	1	-	-	-	-

Interpretations

Available evidence shows that 14DO39 is a campsite of the Plains Village period. That the site is more than a short-term hunting camp or lithic workshop is shown by the presence of a number of pottery vessels, and the paucity of formal lithic tools. Limited primary reduction in lithic manufacture and the predominance of Toronto chert (see chapter 7) suggests transport of raw material to the site. Extensive occupation is not indicated, however, as shown by the lack of habitation evidence (daub, features, etc.) or large amounts of midden debris. Although artifact density dropped off after 20 cm below surface, 10.8% of the total artifact assemblage occurred below plow zone, which may indicate portions of the site are as yet undisturbed.

Recommendations

Material found on the surface and in excavation units re-

flects a temporary occupancy. While some cultural material was discovered below the zone of agricultural disturbance, the quantity and quality of the recovered assemblage does not indicate significant research potential. It is suggested that 14DO39 does not warrant National Register consideration.

14DO40

Name: Unnamed
Cultural Affiliation: Plains Village
Topographic Setting: Upland
Parent Material: Limestone & Shale
Drainage: Deer Creek

Recorded:

Elevation: 277m msl
Slope: 2-3%

Previous Investigations

The only prior investigation of this site was by the University of Kansas, which conducted a survey in 1965. The only visible cultural material was then observed in a garden. Collected artifacts included one unnotched triangular projectile point. one unfinished point, and some debitage (Chism 1966:19-20).

Geomorphic Setting

Site 14DO40 is located on the shoulder of a hillside in Deer Creek valley, at an elevation of approximately 274 to 279m msl. The soil at 14DO40 is the Oska silty clay loam. This sloping soil is a Mollisol formed in residuum from limestone and shale In a representative profile (Table 6.21), the Ap horizon is dark brown silty clay loam about 20 cm thick. The subsoil is dark brown and yellowish brown, very firm silty clay. Bedrock generally occurs at a depth of about 100 to 150 cm below the surface.

Table 6.21. Description of Soil Profile in Unit 3 at 14DO40.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Black brown (10YR3/3) silty clay loam, brown (10YR5/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
20-33	BA	Very dark grayish brown (10YR3/2) silty clay; common fine distinct brown (7.5YR4/4) mottles; weak fine subangular blocky structure; firm; thin discontinuous clay films on ped surfaces; noneffervescent; clear smooth boundary.

Table 6.21. (cont')

33-61	Bt1	Dark brown (7.5YR3/4) heavy silty clay; moderate fine subangular blocky structure; firm; common thick continuous clay films on ped surfaces; noneffervescent; clear smooth boundary.
61-76	Bt2	Yellowish red (5YR4/6) heavy silty clay; moderate fine and medium subangular blocky structure; firm; common thick continuous clay films on ped surfaces; noneffervescent.

The potential for deeply buried cultural materials at 14DO40 is very low. Shoulder slopes are areas of net erosion and therefore deep burial is precluded. Artifacts at the site are not likely to occur below a depth of about 30 cm.

1986 Investigations

14DO40 was surveyed on July 19, and was determined to cover approximately 16,200 square meters (Fig. 6.16). The site is on a hillslope planted in milo (visibility between 30% and 50%), and is bisected by a line of trees running east to west. Immediately to the east of the northern half of the site is the remains of a farmstead. A pedestrian reconnaissance noted clusters of debitage, and Test Units 1, 2 and 3 were placed in these areas. Test Units 4 and 5 were placed in the trees at the southern end of the site in hopes of discovering undisturbed cultural material.

Test Units 1 and 2, in the northern portion of site, showed a quantity of historic material, in addition to prehistoric artifacts. Material was concentrated in the plow zone, while Level 2 (20-30 cm below surface) was devoid of artifacts. Unit 3 showed the same pattern, with soils becoming more compact at 25 cm below surface. Unit 4 reached bedrock at 20 cm below surface, yielding a large amount of natural cherts, so Unit 5 was re-established in the milo field. Flakes were more prevalent in this unit, but rapidly diminished in quantity below 20 cm.

Assemblage

Lithic material was represented by 194 pieces of debitage and eight tools, for a total sample of 202. Tools comprise 4% of this small sample, and only two are formal implements, a biface fragment and a hammerstone. Only eight sherds were recovered, but two were large enough for analysis and were assigned to the Pomona variant. A small amount of burned limestone was also recovered, 35.0 gms. Faunal remains consisted of four small unidentifiable fragments. Historic artifacts (Appendix 1) include pieces of glass, chinaware, stone-

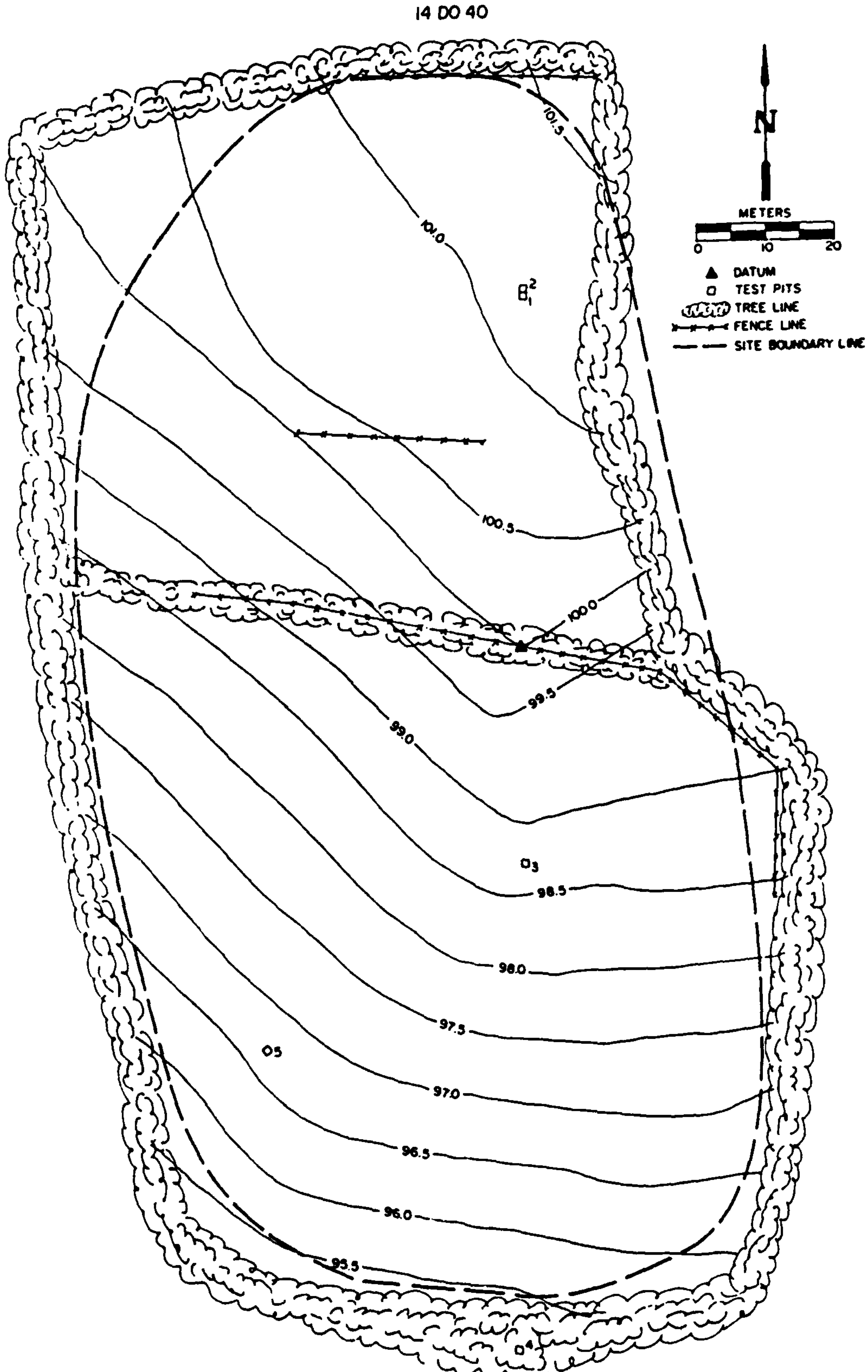


Figure 6.16. Map of 14D040 showing location of test units.

Table 6.22. Cultural Material Recovered from 14DO40.

Test Unit Level (cm)	xu1 1 0-20	xu1 2 20-30	xu2 1 0-20	xu3 1 0-25	xu3 2 25-35
Sherds	3	-	-	4	-
Shatter	14	-	6	11	-
Flakes	16	-	16	23	1
Biface Frag.	-	-	-	1	-
Ret./Ut. Flake	-	-	-	1	-
Fauna	4	-	-	-	-

Table 6.22. (cont').

Test Unit Level (cm)	xu4 1 0-10	xu4 2 10-20	xu5 1 0-20	xu5 2 20-30
Sherds	-	-	1	-
Shatter	35	7	9	2
Flakes	8	5	38	3
Notch/Ut. Shatter	-	1	-	-
Ret./Ut. Flake	-	-	1	1
Ret./Ut. Shatter	1	-	1	-
Hammerstone	-	-	1	-

ware, and porcelain, as well as wire nails, bits of plastic debris, and brick fragments.

Interpretations

As at other sites in the project area, this site is restricted to the plow zone and has suffered a great deal of disturbance. The small artifact assemblage suggests at least a lithic workshop. Historic material in Units 1 and 2 is undoubtedly the result of the area's proximity to the farmstead remains. Lithic material in Unit 4 may be the result of colluvial deposition from the hillslope.

Recommendations

This site contains sparse prehistoric cultural materials that are generally confined to the plow zone. Construction of and activities around the Kampshroeder farm yards, which existed on the site at the time of the 1965 survey (Chism 1966:19), undoubtedly caused considerable disturbance to much of this site. The impact of the farmstead on the prehistoric component is reflected in the amount of historic material recovered (Appendix 1). It is believed that 14DO40 does not possess sufficient integrity or significance for National Register consideration.

14DO59

Name: Unnamed **Recorded:**
Cultural Affiliation: Archaic (?), Plains Woodland, Pomona
Topographic Setting: T-1 Terrace **Elevation:** 270m msl
Parent Material: Alluvium **Slope:** 1%
Drainage: Rock Creek

Previous Investigations

This site experienced its only prior professional investigation in 1965 when the University of Kansas conducted a survey. An unspecified quantity of debitage, burned limestone, one large utlized flake, one knife fragment, ten body sherds, one neck sherd and one rim sherd were collected (Chism 1966:26). A private collection from the site contained eight large corner-notched points, three straight-stemmed points suggested to be of Archaic affiliation, and two large blades. Testing was recommended in the eastern portion of the site, where this material was concentrated.

Geomorphic Setting

Site 14DO59 is located on the T-1 terrace in Rock Creek valley at an elevation of approximately 270 meters msl. The western boundary of the site is marked by a prominent scarp separating the T-1 fill from the T-0b fill. The soil at 14DO59 is the Reading silt loam. This soil is a mollisol formed in loamy alluvium on a gently sloping surface. Table 6.23 provides a detailed description of the soil profile exposed in Trench 1. A 15-cm-thick silt loam Ap horizon overlies a light silty clay loam BA horizon. The BA horizon gives way to a strongly developed Bt horizon. The argillic horizon is 2.35 meters thick and is composed of dark brown and dark yellowish brown silty clay loam. The Bt horizon gradually gives way to a dark yellowish brown silt clay loam BC horizon. There is no evidence of buried paleosols in the T-1 fill at 14DO59.

The age of the T-1 fill at 14DO59 is not known. However, based on radiocarbon dates and archaeological evidence from other sites in the Wakarusa River Basin, late Archaic and later prehistoric sites may be on or at shallow depths below the T-1 surface at 14DO59.

A backhoe trench (Trench 2 in Fig. 6.17) was excavated on the floodplain adjacent to 14DO59 in order to determine whether the site extended out onto the adjacent T-0b surface, and to assess the potential for buried archaeological sites. The soil on the T-0b surface is the Kennebec silt loam. This soil is characterized by a weakly developed A/C profile. The A horizon is very dark grayish rown silty clay loam. The underlying C horizon is brown silty lay loam. An abrupt textural and color change separates the C horizon from a 2C horizon. The 2C

Table 6.23. Description of Soil Profile in Trench 1 at 14DO59.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) silt loam, brown (10YR4/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-25	BA	Very dark grayish brown (10YR3/2) heavy silt loam, brown (10YR5/3) dry; weak fine subangular blocky structure; firm; common shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
25-71	Bt1	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate fine and medium subangular blocky structure; firm; common shiny surfaces on ped faces; thin continuous clay films; common fine pores; noneffervescent; gradual smooth boundary.
71-177	Bt2	Dark yellowish brown (10YR4/4) heavy silty clay loam; common fine faint brown (10YR4/3 mottles; moderate medium subangular blocky structure; thin continuous clay films on ped faces; common fine pores; noneffervescent; gradual smooth boundary.
177-260	Bt3	Dark yellowish brown (10YR4/4) light silty clay loam; moderate fine subangular blocky structure; firm; thin discontinuous clay films on ped faces; common fine pores; noneffervescent; gradual smooth boundary.
260-268+	BC	Dark yellowish brown (10YR4/4) heavy silt loam; moderate fine subangular blocky structure; firm; common fine pores; noneffervescent.

horizon is verydark grayish brown silt loam with thin (<1 mm) lenses of pale brown very fine sand. No cultural materials or paleosols were observed in the walls of the trench. Based on the soil evidence from Trench 2, the potential for buried cultural material in the T-0b fill adjacent to 4DO59 is low. In addition, the surface of the T-0b floodplain is probably too young to have <u>in situ</u> archaeological sites.

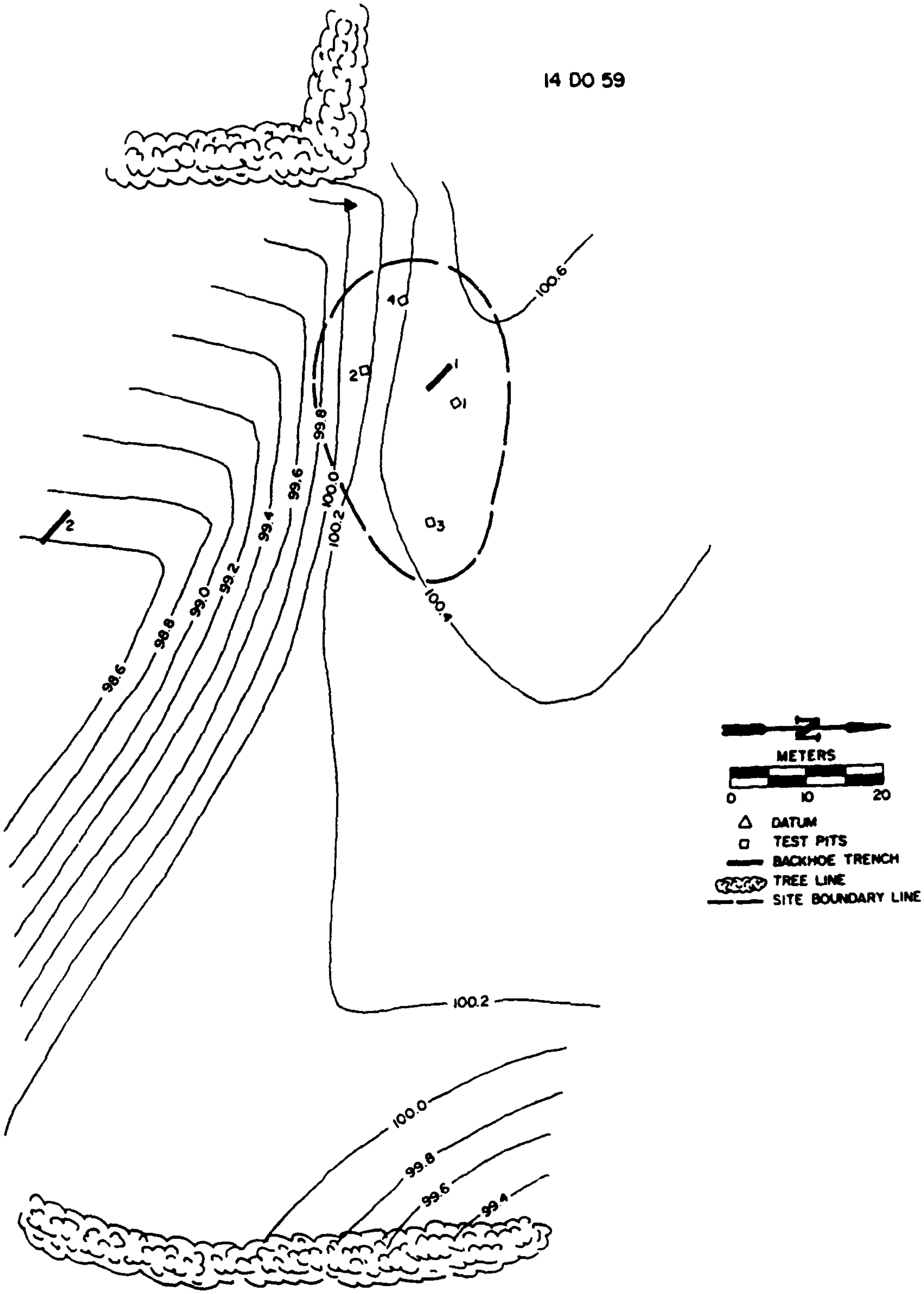


Figure 6.17. Map of 14D059 showing location of test units and backhoe trenches.

1986 Investigations

14DO59 is a small site at the edge of a terrace, and was planted in soybeans when it was visited on August 23. Visibility was low due to the beans and weeds, but a site area of approximately 800 square meters was determined from the survey, based on a diffuse lithic scatter. Test Units 1 and 3 were placed on the terrace, while Units 2 and 4 were along the terrace scarp (Fig. 6.17). Excavations were completed on August 25.

Units 1 and 3 were loose soils and easily excavated, but did not yield many artifacts. A relatively higher concentration appeared between 0 and 20 cm below surface, with fewer artifacts appearing below 20 cm. The other two units along the scarp displayed hard, compact soils, with the majority of artifacts in the upper 10 cm.

Assemblage

The limited artifact assemblage from 14DO59 consisted of 18 pieces of debitage and 17 body sherds (Table 6.24). Three of the sherds were large enough for analysis, and have been assigned to the Pomona variant. Lithic interpretation was not possible.

Table 6.24. Cultural Material Recovered from 14DO59.

Test Unit	xu1	xu1	xu1	xu1	xu2	xu2	xu3
Level	1	2	3	4	1	2	1
(cm)	0-10	10-20	20-30	30-40	0-10	10-20	0-10
Sherds	2	6	2	-	4	-	3
Shatter	-	-	-	-	1	-	1
Flakes	1	3	-	-	2	-	4

Table 6.24. (cont').

Test Unit	xu3	xu3	xu3	xu3	xu4	xu4	xu4
Level	2	3	4	5	1	2	3
(cm)	10-20	20-30	30-40	40-50	0-10	10-20	20-30
Shatter	-	-	-	-	1	-	-
Flakes	1	1	1	-	1	1	-

Interpretations

14DO59 appears to be restricted to the plow zone, and is suffering erosion along the terrace edge. If the small artifact assemblage is representative of the site, a short-term campsite belonging to the Pomona variant is indicated.

Recommendations

This small site contains very little cultural material and most of that occurs at such shallow depths as to have been disturbed by farming. It possesses little research potential and, therefore, is not deemed significant. It is not recommended for National Register consideration.

14DO61

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Unknown
Topographic Setting: T-1 terrace
Elevation: 270m msl
Parent Material: Alluvium
Slope: 2%
Drainage: Rock Creek

Previous Investigations

This site was surveyed by the University of Kansas in 1965, at which time only sparse amounts of lithic debris were recovered from the margins of an alfalfa field. No culturally diagnostic artifacts were found during that investigation (Chism 1966:27).

Geomorphic Setting

Site 14DO61 is located on the T-1 terrace in Rock Creek valley at an elevation of about 270m msl. The surface of the terrace drops to the north and northeast towards the scarp separating the T-1 fill from the T-0b fill. The soil at 14DO61 is a badly deflated Reading silt loam. Table 6.25 provides a detailed description of the soil profile exposed in Unit 2. A thin, brown silty clay loam A horizon overlies a dark yellowish brown silty clay loam Bt horizon. Erosion has removed the original A horizon and exposed the subsoil on the T-1 surface at many locations within the area of 14DO61. The erosion problem at this site is attributed to the absence of agricultural terraces on the sloping T-1 surface.

Table 6.25. Description of Soil Profile in Unit 2 at 14DO61.

Depth (cm)	Soil Horizon	Description
0-16	Ap	Dark brown (10YR3/3) light silty clay loam, brown (10YR5/3) dry; moderate coarse granular structure; firm; noneffervescent; abrupt smooth boundary.
16-30	Bt	Dark yellowish brown (10YR4/4) heavy silty clay loam; moderate medium subangular structure; firm; thin discontinuous clay films on ped faces; noneffervescent.

The age of the T-1 fill at 14DO61 is not known. However, based on radiocarbon dates and archaeological evidence from other sites in the Wakarusa River basin, late Archaic and later prehistoric sites may be on or at shallow depths below the T-1 surface.

1986 Investigations

14DO61 was planted in milo at the time of investigations on August 23. The survey revealed a sparse lithic scatter covering an area of approximately 800 square meters. One chipped stone knife fragment was collected from the surface (Fig. 6.13f [p. 91]), and four test units were established. Excavations were begun in 10 cm levels, as a lack of A horizon was noted. Traces of the original surface were seen only in Unit 1. The few artifacts that were recovered came primarily from the upper 0 to 10 cm in the four units. Test Unit 2 was taken to 30 cm below surface showing three pieces of debitage in the last level. As erosion was quite obvious and cultural material was not forthcoming, excavation ceased at 20 cm below surface in the other units.

Assemblage

This site produced only 14 pieces for a lithic sample, which includes a knife fragment and a retouched flake. Pottery is absent and the one faunal remain is a gastropod shell. Natural cherts were seen in the excavations, and a small amount (3.0 gms) of burned limestone was recovered.

Table 6.26. Cultural Material Recovered from 14DO61.

Test Unit		xu1	xu1	xu2	xu2
Level	Sur-	1	2	1	2
(cm)	face	0-15	15-25	0-10	10-20
Shatter		1	-	-	1
Flakes		3	-	-	-
Knife Frag.	1	-	-	-	-

Table 6.26. (cont').

Test Unit	xu2	xu3	xu3	xu4	xu4
Level	3	1	2	1	2
(cm)	20-30	0-10	10-20	0-10	10-20
Shatter	-	1	2	-	-
Flakes	2	-	-	-	2
Ret./Ut. Flakes	1	-	-	-	-
Fauna	-	-	-	1	-

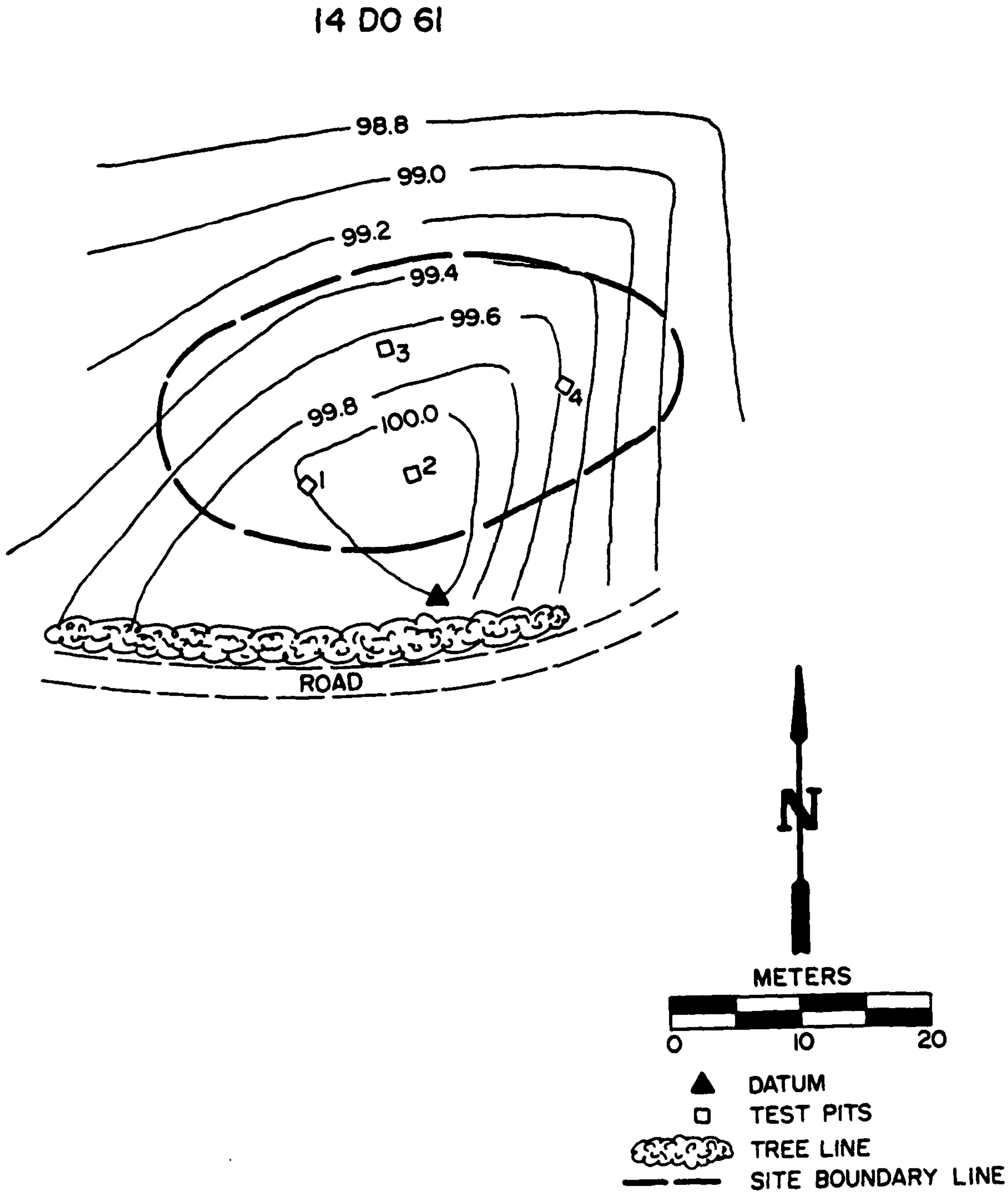


Figure 6.18. Map of 14D061 showing location of test units.

Interpretations

The small artifact assemblage and lack of diagnostic material precludes determination of cultural affiliation or site type, other than the likelihood that 14DO61 was a small campsite.

Recommendations

Cultural material at the site was sparse and of an undiagnostic nature. Erosion of the A horizon at the site, to which this material is largely confined, has been severe. Consequently, the stratigraphic integrity of 14DO61 has suffered considerable damage. It is not considered worthy of National Register consideration.

14DO62

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Plains Woodland
Topographic Setting: T-1 Terrace
Elevation: 273m msl
Parent Material: Alluvium
Slope: <1%
Drainage: Rock Creek

Previous Investigations

This site's only previous investigation occurred in 1965 when the University of Kansas conducted a limited survey. The recorded extent of the site was based on the reports of a private collector, whose collection included twelve large corner-notched projectile points, two small corner-notched points, one barbed point with a straight stem, one straight-stemmed point with rounded shoulders, a contracting-stemmed point, one large unnotched triangular projectile point or preform, a knife, drill, and possible atlatl weight. Unfortunately, the survey by KU was limited to the margin of the field in which the site is located because of possible crop damage. An Archaic or Woodland affiliation was tentatively suggested based on the private collection (Chism 1966:27).

Geomorphic Setting

Site 14DO62 is located on a small remnant of the T-1 terrace in Rock Creek Valley at an elevation of approximately 273m msl. The terrace remnant has been isolated from the uplands as a result of meandering by Rock Creek and subsequent accumulation of T-0b alluvium on all four sides of the terrace. Consequently, the T-1 surface drops down in every direction away from the center of the terrace remnant (Fig. 6.19).

The soil on the T-1 surface at 14DO62 is the Reading silt loam. Table 6.27 provides a detailed description of the soil profile exposed in Unit 2. A thin, very dark grayish brown

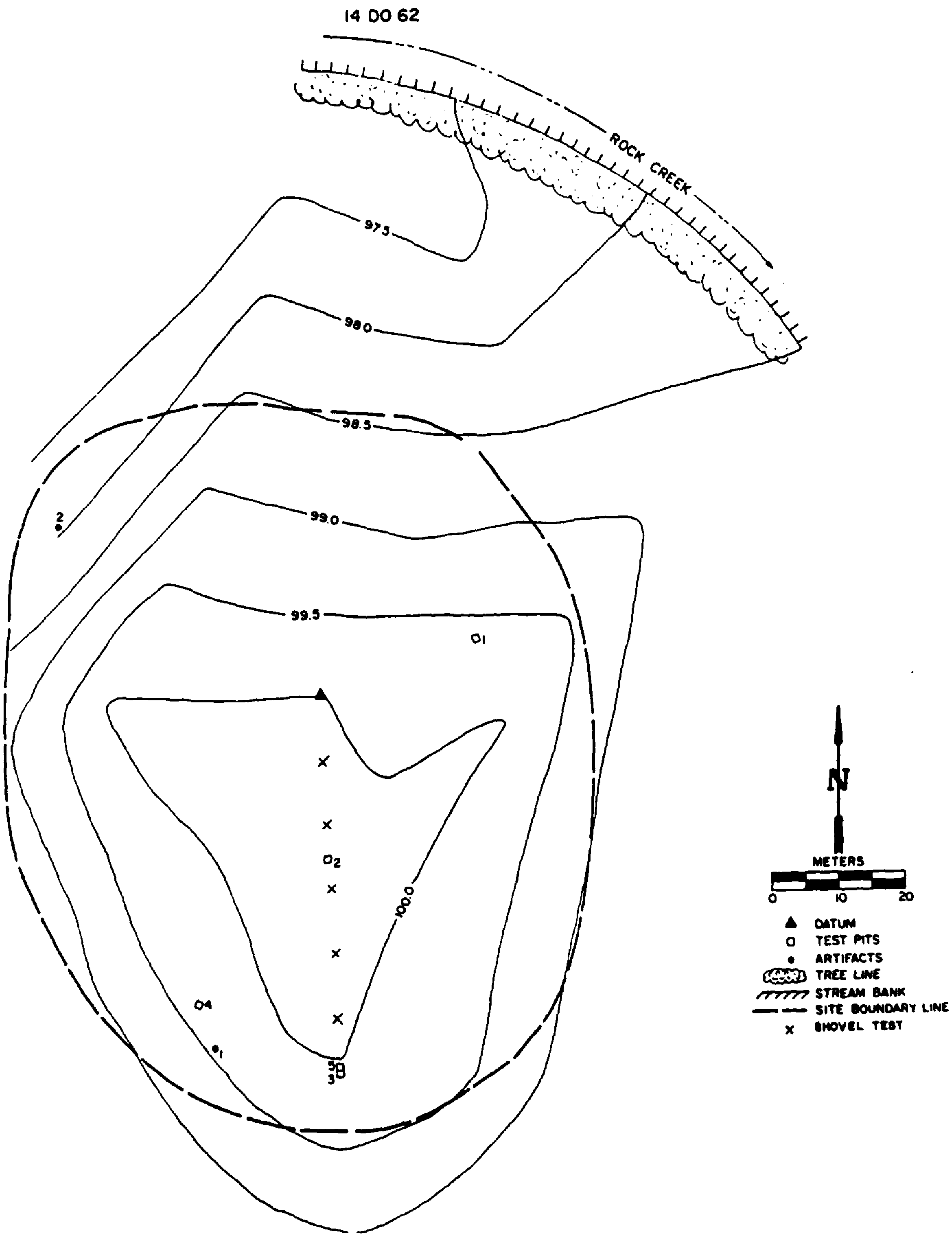


Figure 6.19. Map of 14DO62 showing location of surface finds and test units.

Table 6.27. Description of Soil Profile in Unit 2 at 14DO62.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) silt loam, dark brown (10YR3/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-25	BA	Very dark grayish brown (10YR3/2) light silty clay loam, dark brown (10YR3/3) dry; weak fine subangular blocky structure; firm; non-effervescent; gradual smooth boundary.
25-41	Bt	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate medium subangular blocky structure; firm; common very fine dark grayish brown (10YR4/2) coatings on ped faces; thin discontinuous clay films; non-effervescent.

silt loam Ap horizon overlies a very dark grayish brown silty clayloam Bt horizon. Soil erosion has deflated steeply sloping T-1 surfaces at 14DO62, exposing subsoil along the terrace scarp. Evidence of soil erosion, in the form of Ap/Bt profiles, was seen in Test Units 3, 4 and 5.

The age of the T-1 fill at 14DO62 is not known. However, based on radiocarbon dates and archaeological evidence from other sites in the Wakarusa River Basin, late Archaic and later prehistoric sites may be on or at shallow depths below the T-1 surface at 14DO62.

1986 Investigations

14DO62 is on a terrace remnant on the south side of Rock Creek, and is not readily accessible. Investigations were conducted on August 30, with access gained by fording the creek. The site area (approximately 8000 square meters) was overgrown with tall weeds and grass, but a light lithic scatter was found in a weedless strip surrounding a small knoll (Fig. 6.19). The top of the knoll (which turned out to be an eroded terrace, as noted in the preceding section) was also overgrown with weeds, so transects were made using a machete and shovel tests; artifacts were not found in these transects. A burned limestone concentration was found at the southern end of the terrace, as was a large preform (Fig. 6.19, Artifact 1; Fig. 6.13h [p. 91]). A blocky end scraper was found in the northwest portion of the site (Fig. 6.19, Artifact 2; Fig. 6.20a). Four excavation

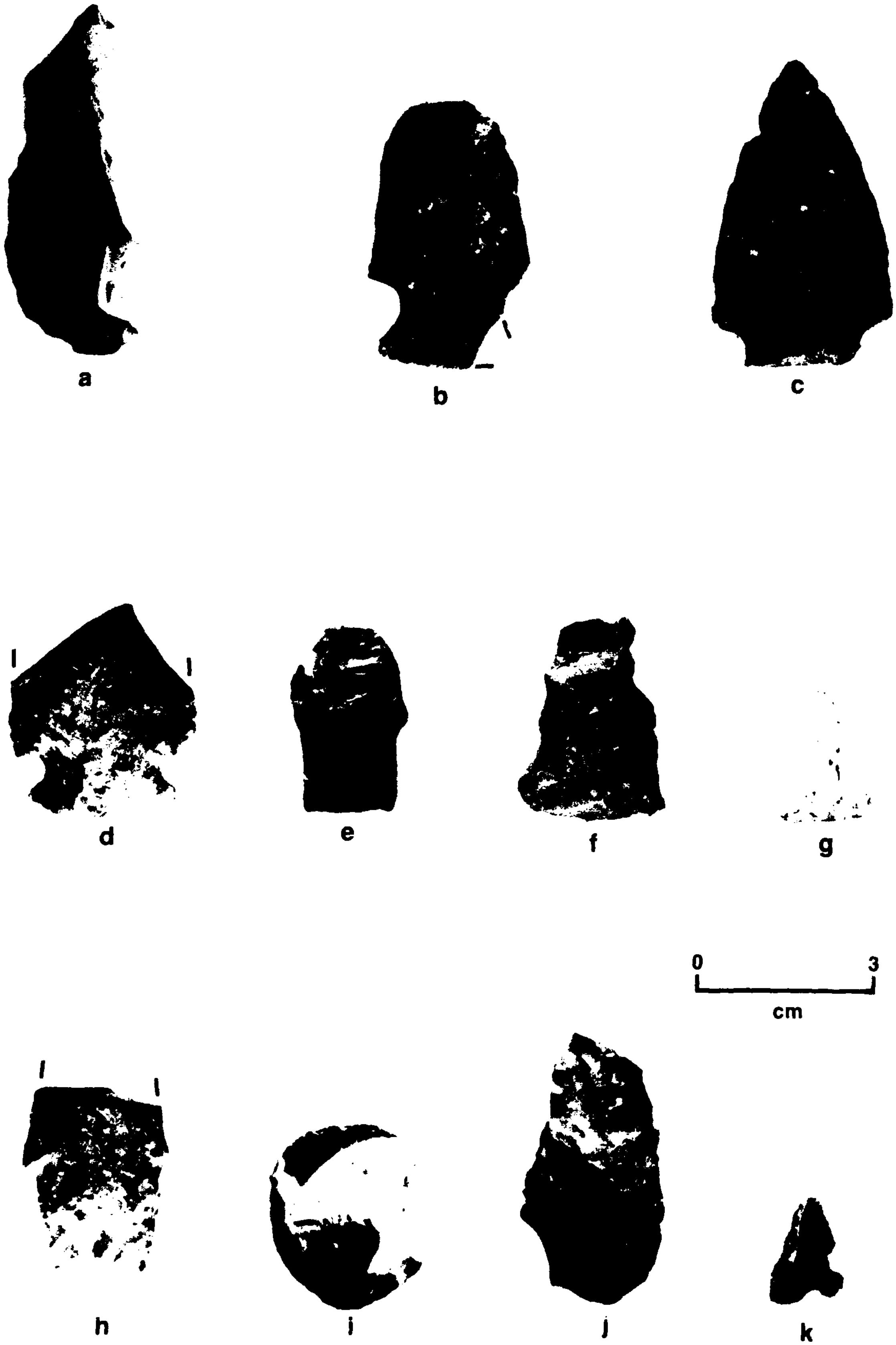


Figure 6.20. Selected artifacts from 14DO62, 14DO138, 14DO141, 14DO309, and 14SH5. a) blocky end scraper, DO62860002 b) corner-notched projectile point, DO138860001 c) corner-notched projectile point, DO138860448 d) corner-notched projectile point, DO141860123 e) straight-stemmed projectile point base, DO141860003 f) end scraper, DO141860004 g) unnotched arrow point, DO1410005 h) contracting-stemmed projectile point fragment, DO309860001 i) distal-lateral scraper, DO309860002 j) biface, SH5860001 k) side-and-basal notched arrow point, SH5860051.

units were established, with Unit 1 placed within a debitage cluster, Unit 2 on top ofthe terrace to determine if there was buried material, Unit 3 in the burned limestone concentration, and Unit 4 near the preform. Unit 5 was established later to further investigate the possible hearth.

As the site had been previously cultivated, Level 1 was taken down to 20 cm below surface. Test Unit 1 showed the plow zone boundary at 18 cm below surface. The majority of artifacts were in the upper 20 cm, while Level 3 (30-37 cm below surface) showed very few artifacts. Unit 2 yielded two pieces of debitage from Level 1, showing plow zone to 18 cm below surface, and was sterile from 20 to 40 cm. Artifacts in Unit 4 were also restricted to Level 1 and included a bifacial hoe (Fig. 6.13g [p. 91]). Burned limestone in Unit 3 was restricted to the plow zone, none appearing below 20 cm. Unit 5, adjacent to Unit 3, was excavated to 15 cm below surface, the base of the plow zone (see Table 6.27). No intact feature, such as a hearth, that might have been the source of the burned limestone, was discovered.

Assemblage

Although the site appeared promising, the artifact assemblage is quite small. Of a total of 136 lithic pieces, 128 are debitage and eight are tools (Table 6.28). The blocky end scaper is indicative of a Woodland period occupation, corroborating the previous projectile point finds, while the chipped stone hoe suggests digging activities. One sherd was recovered and was too small for analysis. The 18 pieces of burned limestone recovered from the remains of the hearth in Units 3 and 5 totaled 78.5 gms. Three faunal remains were also recovered. Two of these are unidentifiable fragments, while the third is a marginal fragment of a turtle carapace.

Table 6.28. Cultural Material Recovered from 14DO62.

Test Unit		xu1	xu1	xu1	xu2	xu2	xu2
Level	Sur-	1	2	3	1	2	3
(cm)	face	0-20	20-30	30-37	0-20	20-30	30-40
Sherds	-	1	-	-	-	-	-
Shatter	-	10	2	-	1	-	-
Flakes	-	41	12	3	1	-	-
Cores	-	1	-	-	-	-	-
Preform	1	-	-	-	-	-	-
End Scraper	1	-	-	-	-	-	-
Ret./Ut. Shatter	-	1	-	-	-	-	-
Ret./Ut. Core	-	1	-	-	-	-	-
Fauna	-	2	-	-	-	-	-

Table 6.28. (cont').

Test Unit Level (cm)	xu3 1 0-20	xu3 2 20-30	xu4 1 0-20	xu4 2 20-35	xu5 1 0-15
Shatter	2	-	1	-	4
Flakes	22	1	13	-	14
Bifacial Hoe	-	-	1	-	-
Biface Frag.	-	-	-	-	1
Ret./Ut. Shatter	-	-	-	-	1
Fauna	1	-	-	-	-

Interpretations

Based on previous collections, and the two diagnostic chipped stone tools, 14DO62 represents a Woodland occupation. However, the small artifact sample does not permit identification of site usage. That the site was more than just a temporary hunting camp is suggested by the presence of the bifacial hoe. The severe erosion of the site makes further interpretation impossible.

Recommendations

The sparse amount of cultural material present at this site does not present any significant research potential. Erosion of the A horizon on the south side of the terrace on which the site occurs has exposed cultural deposits to plow disturbance, as is evidenced by the apparent destruction of a hearth in the area of Units 3 and 5. Although some small quantities of material were found below plow zone at the site, these few items may have been relocated from upper levels by rodent disturbance. Site 14DO62 does not possess sufficient research potential to warrant its consideration for the National Register.

14DO68

Name: Unnamed
Recorded: KU, 1966
Affiliation: Plains Village (?)
Topographic Setting: T-1 Terrace
Elevation: 267m msl
Parent Material: Alluvium
Slope: <1%
Drainage: Deer Creek

Previous Investigations

This site was first investigated in 1966 by the University of Kansas, when it was "extensively tested" (Johnson 1968:122-126). No evidence of cultural material was noted below the plow zone. Lithic and ceramic artifacts recovered indicated a

Clinton phase occupation. The map accompanying the site form (KU, Museum of Anthropology files) is a grid of the excavated portion of the site. The locations of a "house" (Feature 1), "post hole" (Feature 2), and "pocket cache" (Feature 3) are noted. Unfortunately, this simple sketch map is the only record of these finds.

Geomorphic Setting

Site 14DO68 is located on the T-1 terrace in Deer Creek Valley at an elevation of approximately 265 to 270 meters msl. The soil at 14DO68 is the Reading silt loam. This soil is formed in loamy alluvium on a nearly level surface. Table 6.29 provides a detailed description of the soil profile exposed in Trench 1. The Ap horizon is very dark grayish brown silt loam about 15 cm thick. The underlying BA horizon gradually gives way to a strongly developed Bt horizon at a depth of 38 cm. The argillic horizon ranges from dark brown to dark yellowish brown silty clay loam, and it is characterized by fine and medium subangular blocky structure. The Bt horizon is 1.82 m thick, and it gradually gives way to a yellowish brown silt loam C horizon.

Table 6.29 Description of Soil Profile in Trench 1 at 14DO68.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) heavy silt loam, brown (10YR4/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-63	BA	Dark brown (10YR3/1) silty clay loam, very dark grayish brown (10YR3/2) dry; moderate fine subangular blocky structure; firm; noneffervescent; gradual smooth boundary.
38-63	Bt1	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate fine and medium subangular blocky structure; firm; shiny surfaces on ped faces; thin discontinuous clay films; few pale brown (10YR6/3) silt coatings on faces of peds; noneffervescent; gradual smooth boundary.
63-182	Bt2	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate medium subangular blocky structure; firm; common pale brown (10YR6/3) silt coating on faces of peds; thin discontinuous clay films; few fine pores; noneffervescent; gradual smooth boundary.

Table 6.29. (cont')

182-220	Bt3	Dark yellowish brown (10YR4/4) silty clay loam; moderate fine subangular blocky structure; firm; thin discontinuous clay films; common fine pores; noneffervescent; clear smooth boundary.
220-241	BC	Yellowish brown (10YR5/4) silt loam, dark yellowish brown (10YR3/4) dry; weak fine subangular blocky structure; firm; may fine pores; noneffervescent; gradual smooth boundary.
241-25+	C	Yellowish brown (10YR5/4) silt loam, dark yellowish brown (10YR3/4) dry; massive; firm; many fine pores; noneffervescent.

The age of the T-1 fill at 14DO68 is not known. However, based on radiocarbon data and archaeological evidence from other sites in the Wakarusa River Valley, the T-1 surface began to stabilize around 3000 years ago. Thus, evidence for late Archaic and later cultural periods may be on or at shallow depths below the T-1 surface at 14DO68.

1986 Investigations

14DO68 is immediately adjacent to Deer Creek and was planted in soybeans when visited on July 28. As visibility was low, a series of shovel tests were made between rows. A diffuse lithic scatter was identified within a 2000 square meter area that extended along the creek bank (Fig. 6.21). Four test units were placed along the length of the site.

Excavation was completed on July 31 and August 1. The plow zone was dug as one level, 0 to 20 cm below surface, and showed the same pattern displayed at previous sites. Artifacts were concentrated in the upper 20 cm and rapidly diminished in quantity below that. Since the site was situated in alluvial soils, units were taken as deep as 60 cm below surface to look for buried components. Although a few artifacts were found between 40 and 50 cm below surface, evidence of intact deposits was not seen.

Assemblage

This site yielded a small artifact assemblage, consisting of 130 pieces of lithic material, four pottery sherds and seven pieces of bone (Table 6.30). The one lithic tool is a retouched flake. Two of the body sherds were large enough to be identified

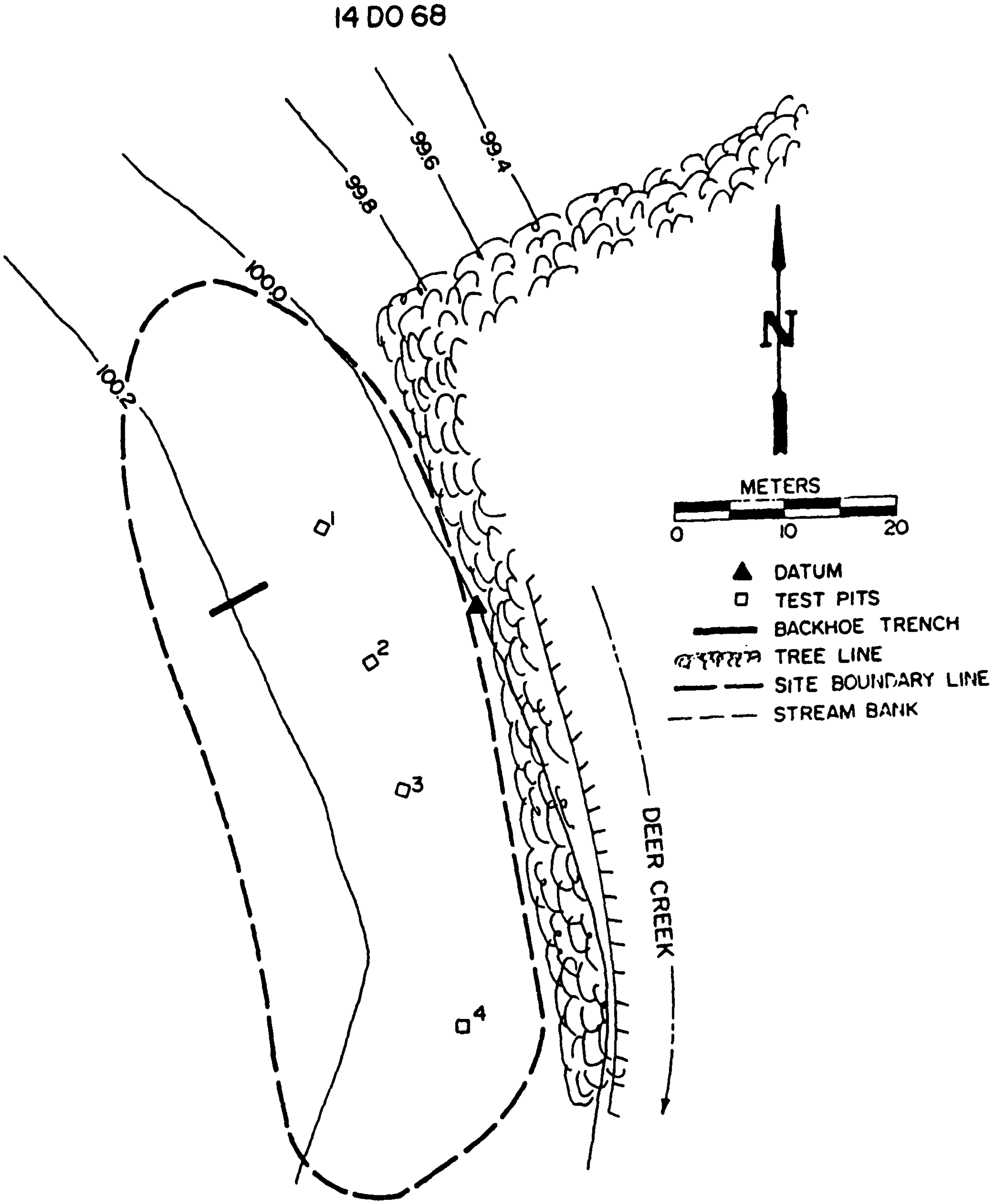


Figure 6.21. Map of 14DO68 showing location of test units and backhoe trench. Shovel tests occurred west of the site area (off map) and all were negative.

Table 6.30. Cultural Material Recovered from 14DO68.

Test Unit	xu1	xu1	xu1	xu1	xu2	xu2
Level	1	2	3	4	1	2
(cm)	0-20	0-30	30-40	40-50	0-20	20-30
Sherds	1	-	-	-	-	-
Shatter	7	-	-	1	3	1
Flakes	23	5	3	1	31	8
Ret./Ut. Flake	-	-	-	-	1	-
Fauna	-	1	-	-	1	-

Table 6.30. (cont').

Test Unit	xu2	xu2	xu2	xu3	xu3	xu3
Level	3	4	5	1	2	3
(cm)	30-40	40-50	50-60	0-20	20-30	30-40
Sherds	-	-	-	1	-	-
Shatter	-	1	-	-	2	-
Flakes	-	2	-	2	9	1

Table 6.30. (cont').

Test Unit	xu4	xu4	xu4	xu4
Level	1	2	3	4
(cm)	0-20	20-30	30-40	40-50
Sherds	2	-	-	-
Shatter	6	2	1	-
Flakes	14	5	1	-
Fauna	2	4	-	-

as Pomona ware. All bone fragments are small and unidentifiable, although one piece showed evidence of burning. Small amounts of burned earth and burned limestone were recovered from the upper levels of all units. Also present were a number of historic artifacts.

Interpretations

The limited artifact assemblage from 14DO68 does not permit interpretation as to site type. Cultural affiliation, based on the ceramic evidence, is that of the Pomona variant of the Plains Village period. The site has suffered disturbance by agricultural activity.

Recommendations

Although some cultural material was found at 14DO68 below the level of agricultural disturbance, it occurs in decreasing numbers in all units. This probably reflects disturbance of the cultural deposits by rodents. The sparse nature of the archaeological resources, and their dubious stratigraphic integrity, preclude a recommendation of eligibility for the National Register for this site.

14DO69

Name: None
Recorded: KU, 1966
Cultural Affiliation: Unknown
Topographic Setting: Cut-bank
Elevation: 262-265m msl
Parent Material: Alluvium (?)
Slope: Unknown
Drainage: Deer Creek

Previous Investigations

This site was recorded in 1966 by the University of Kansas (KUMA site files). It consisted then of lithic debris, shell and bone found eroding from the cut-bank on the south side of Deer Creek. No additional work was conducted at the site until the Clinton Lake Archaeological Project.

***Geomorphic* Setting**

The geomorphic setting of this site could not be investigated because it is currently inundated by Clinton Lake.

1986 Investigations

The normal flood pool of the reservoir is 287 m. Since the elevation of the site is from 262-265 m, the site is at least 22 m under water at normal flood pool. In conducting the preliminary phase of the project, a set of aerial photographs showing the location of each site to be tested was reviewed at the Clinton Lake Information Center. This photography was completed in July 1983, when the lake level was at a low elevation (286.9 m). The old channel of Deer Creek, on which the site is located, is still clearly indicated by parallel lines of drowned trees that occur well within the lake. An attempt to visit this site was made on August 4 by a party of two persons. The beach at the nearest approach to the old channel was surveyed for any cultural material that might indicate the site extended to that area. The beach is composed of a stretch of exposed bedrock about ten meters wide between the shoreline and an adjacent steep slope. No artifacts were seen. The elevation of the lake at the time of our visit was 287.2 m (875.47 ft), or slightly higher than normal flood pool. At that elevation the site was at least 22 m under water.

Assemblage

No artifacts could be obtained from this inundated site.

Interpretations

The data recovered during the original investigation of the site indicates a possible camp site of undetermined cultural affiliation. Unfortunately, little else can be said of this site.

Recommendations

Given the fact that the site has been inundated since the filling of the reservoir and is beyond any kind of archaeological investigation at the present time, no recommendation of National Register eligibility can be presented.

14DO75

Name: Unnamed **Recorded:** KU, 1966
Cultural Affiliation: Plains Village (?)
Topographic Setting: T-1 Terrace **Elevation:** 267m msl
Parent Material: Alluvium **Slope:** <1%
Drainage: Deer Creek

Previous Investigations

This site was recorded by the University of Kansas in the summer of 1966 (KUMA site files) and received its only prior investigation at that time. It is described as consisting of a small concentration of lithic debris suggestive of a single "Central Plains" occupation.

Geomorphic Setting

Site 14DO75 is located on the T-1 terrace in Deer Creek Valley at an elevation of approximately 269m msl. The soil at 10DO75 is the Reading silt loam. This soil is a Mollisol formed in loamy alluvium on a nearly level surface. Table 6.31 provides a detailed description of the soil profile exposed in Unit 1. A 22-cm-thick silt loam Ap horizon overlies a 20-cm-thick black, silty clay loam BA horizon. Soil color suggests that a buried A horizon is welded into the BA horizon. The presence of charcoal flecks throughout the upper 15 cm of the BA horizon also suggests that what is now a transitional zone between the A and Bt horizons was once a stable surface. The BA horizon gradually gives way to a strongly developed Bt horizon at a depth of 40 cm. The argillic horizon is very dark grayish brown silty clay loam, and it is characterized by medium subangular blocky structure.

Table 6.31. Description of Soil Profile in Unit 1 at 14DO75.

Depth (cm)	Soil Horizon	Description
0-22	Ap	Very dark grayish brown (10YR3/2) heavy silt loam, dark brown (10YR3/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
22-40	BA(Ab)	Black (10YR2/1) silty clay loam, very dark grayish brown (10YR3/2) dry; moderate fine subangular blocky structure; firm; welded A horizon; many charcoal flecks in the upper 15 cm; noneffervescent; gradual smooth boundary.
40-65+	Bt	Very dark grayish brown (10YR3/2) heavy silty clay loam, dark brown (10YR3/3) dry; moderate medium subangular blocky structure; firm; shiny surfaces on many ped faces; thin continuous clay films on ped faces; brown (10YR4/3) coatings on some ped faces; noneffervescent.

The age of the T-1 fill at 14DO75 is not known. However, based on radiocarbon dates and archaeological evidence from sites is the Wakarusa River drainage system, the T-1 surface began to stabilize about 3000 years ago. Thus, evidence for late Archaic and later cultural periods may be on or at shallow depths below the T-1 surface at 14DO75. The potential for buried cultural materials is especially high in the zone of the welded Ab horizon.

1986 Investigations

14DO75 was visited on July 28, and was planted in soybeans and thickly overgrown with weeds at that time. Based on the original site survey form, the most likely area fitting the site description was selected and four north-south transects were cleared with a machete for the purpose of shovel testing. Transects were approximately 60 meters in length, with shovel tests made every 15 meters. No artifacts were found, so four excavation units were randomly placed within the surveyed transects (Fig. 6.22).

Excavation was done on July 31, August 1, and August 4. As the site is in an alluvial setting, the plow zone was difficult to distinguish. A slight textural change below 18 cm was used to justify the removal of 0 to 20 cm as the plow zone. Units 1 and 4 proved to be devoid of cultural material, while Unit 3 yielded a single piece of shatter. Nine pieces of debitage

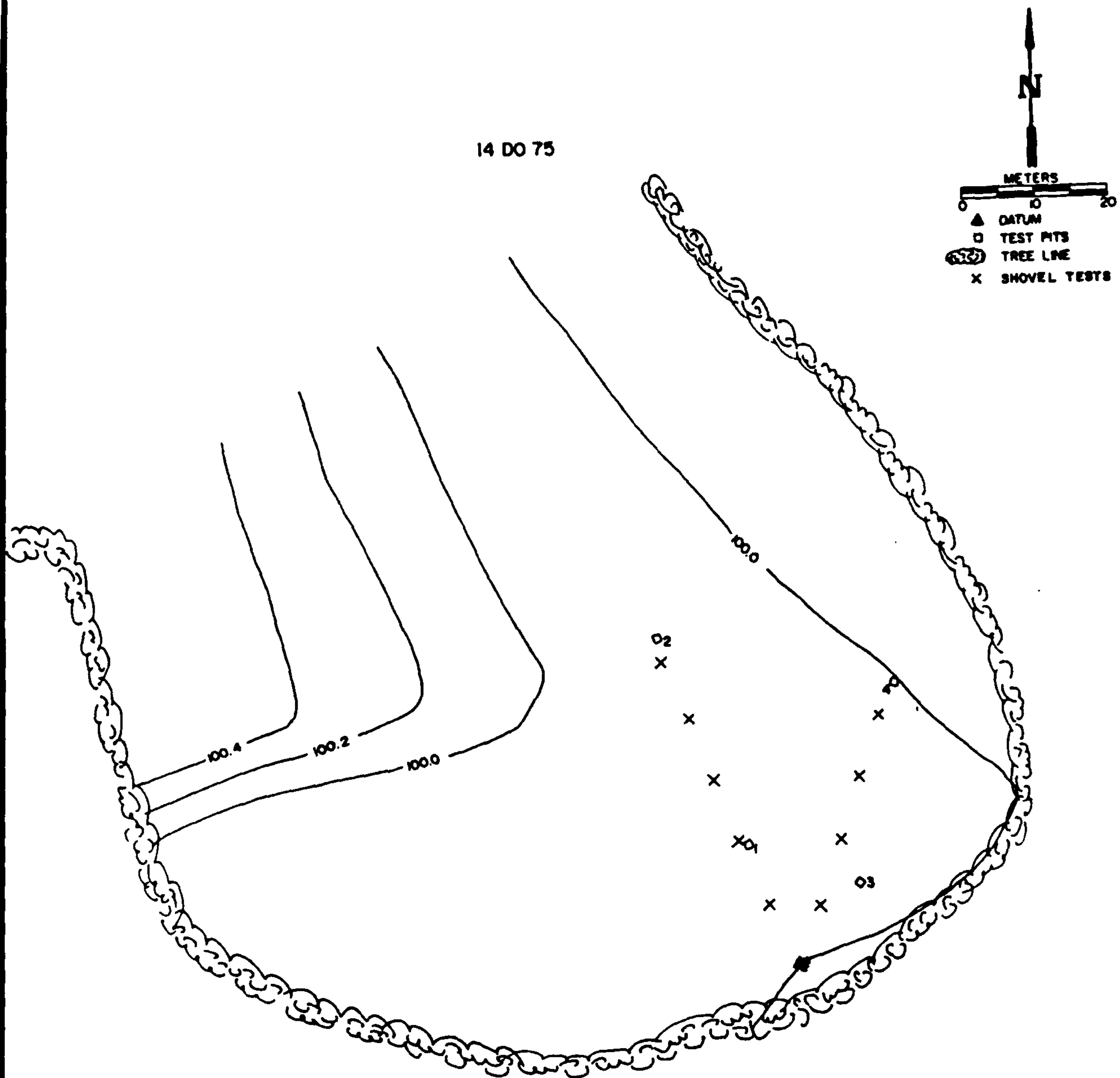


Figure 6.22. Map of 14DO75 showing location of test units. The boundaries of this site could not be determined because of the absence of any cultural material on the surface.

were recovered from Unit 2. Charcoal appeared in all units, but the largest quantity was in Unit 1, Level 3 (30-40 cm below surface). Largefragments in this level were not wood charcoal, but rather showed the appearence of the stems of annual plants.

Assemblage

The artifact assemblage from 14DO75 consists of ten pieces of debitage and an unidentifiable bone fragment (Table 6.32).

Table 6.32. Cultural Material Recovered from 14DO75.

Test Unit	xu2	xu2	xu2	xu2	xu2
Level	1	2	3	4	5
(cm)	0-20	20-30	30-40	40-50	50-60
Shatter	1	-	-	1	1
Flakes	2	2	1	1	-
Fauna	-	1	-	-	-

Table 6.32. (cont').

Test Unit	xu3	xu3	xu3	xu3
Level	1	2	3	4
(cm)	0-20	20-30	30-40	40-50
Shatter	-	-	1	-
Flakes	-	-	-	-

Interpretation

On the basis of the small assemblage little can be said about 14DO75 other than the speculation that it represents a short-term occupation where some chipped stone tool manufacture or maintenance was conducted.

Recommendations

Site 14DO75 does not contain sufficient cultural deposits to consider it eligible for the National Register.

14DO137

Name: Unnamed
Recorded: IRI, 1976
Cultural Affiliation: Paleoindian
Topographic Setting: Upland
Elevation: 305-314m msl
Parent Material: Limestone
Slope: 2%
Drainage: Dry Creek

Previous Investigations

The initial survey of this site was conducted by Iroquois Research Institute in 1976. It resulted in the recovery of a base of a fluted, Clovis-type projectile point. Dense amounts of lithic debris and tools were noted at that time (Chambers et al. 1977:126-128). Additional surface survey and the excavation of seven one meter square test pits by IRI in 1978 yielded 417 artifacts, all undiagnostic (Nathan 1980:97-105). Cultural material was found over an area of 30,000 m^2. Artifacts were reportedly found to a depth of 70 cm below surface in one unit and to 50-60 cm below surface in four other units. The site was judged to be potentially eligible for the National Register and considered to be vulnerable to vandalism and pothunting.

Geomorphic Setting

The site is located on the summit of an interfluve between Dry Creek and the Wakarusa River, and is at an elevation of approximately 305 to 314 m msl. Soils at 14DO137 are the Martin-Oska silty clay loams. This complex of sloping soils occurs on narrow ridges almost entirely in areas where the Lecompton limestone formation crops out. The Martin-Oska complex at 14DO137 is characterized by moderately deep soils with thick, silty clay loam A horizons above thick silt clay Bt horizons. Table 6.33 provides a detailed description of a soil profile exposed in Trench 1.

Table 6.33. Description of Soil Profile in Trench 1 at 14DO137.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; moderate medium granular structure; friable; noneffervescent; abrupt smooth boundary.
20-61	Bt1	Dark yellowish brown (10YR3/4) silty clay, dark yellowish brown (10YR4/4) dry; many fine distinct yellowish red (5YR4/6) mottles; common very dark gray (10YR3/1) coatings in root channels and on ped facings; moderate medium and coarse angular, and subangular blocky structure; very firm; common thick continuous clay films on ped surfaces; common pressure cutans; common very fine iron and manganese concretions; noneffervescent; clear smooth boundary.

Table 6.33. (cont')

61-94	C	Dark brown (10YR3/3) and olive brown (2.5Y4/4) silty clay; few fine distinct yellowish red (5YR4/6) mottles; massive; very firm; few fine iron and manganese concretions; noneffervescent; abrupt irregular boundary.
94+	R	Limestone.

Although soil erosion has been controlled by terracing and the establishment of grass cover at 14DO137, much of the land surface has been drastically disturbed by previous cultivation and by the construction of embankments to intercept runoff. Thus, cultural materials are not likely to be found in situ. Furthermore, the potential for deeply buried cultural materials at the site is very low. The residual soils are products of pedogenesis on upland surfaces that have been relatively stable throughout the Holocene. Because the Martin-Oska soils are at the highest position in the landscape, they do not receive sediment from run-off. Consequently, burial of cultural materials may occur only through bioturbation, littering (accumulation of organic matter), and aerosol (loessal) addition. The slow rate of soil accretion resulting from these three processes during the Holocene precludes deep burial of artifacts.

1986 Investigations

When this site was surveyed on August 4, a scattering of lithic debris, including cores, flakes, and chips, was found scattered over much of the ridge for a distance of about 300 m north-south and 60 to 130 m east-west (Fig. 6.23). This includes an area of approximately 30,000 m^2. The site area was in native tallgrass and visibility ranged from poor to fair (0-40%). Visibility was good in a poorly drained area on the southwestern edge of the site, on the highest terrain. Vegetation in that area was low because of the trampling effects of deer that apparently have been attracted to the pooling water trapped behind one of the artificial terraces that run parallel in a north-south direction along the ridge. A concentration of lithic debris was noted in that area.

A datum was established just off the southern edge of the site area and along a row of trees that had been associated with a farmstead (this farm is indicated on the U.S.G.S. 7.5' topographic map). With reference to this permanent point, twelve excavation units were placed along the ridge in areas where lithic material was observed. Unit 5 was placed in the southwestern area of artifact concentration (Fig. 6.23). Evidence of one of the test pits excavated by IRI was noted within

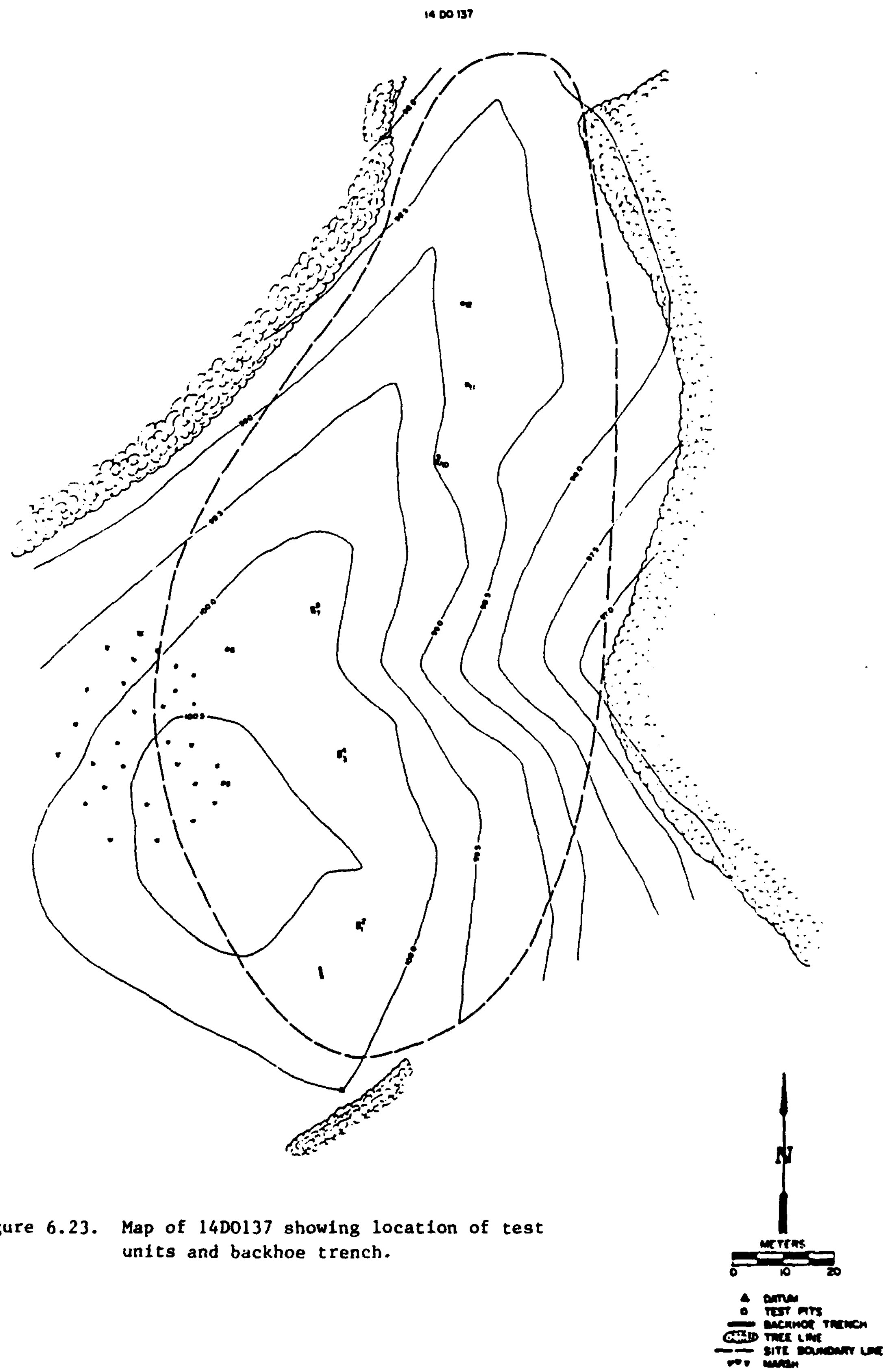


Figure 6.23. Map of 14DO137 showing location of test units and backhoe trench.

five meters of that unit. Unfortunately, the pits dug by IRI were not establishedwith reference to a permanent datum and it was not possible to determine which of their seven units it was.

Excavation of all units was hindered by the dense clayey soil present throughout the site area. Excavation of Unit 5 was extremely difficult because of the compaction of the clay soil caused by animal traffic. Moreover, the testing of this site, which occurred from August 6 to 12, was interrupted on several occasions by rain. Despite continual bailing of Unit 5, poor drainage prevented its completion and more effort was put into the excavation of other units. The cultural material recovered from all units is itemized in Table 6.34.

Table 6.34. Cultural Material Recovered from 14DO137.

Test Unit Level (cm)	xu1 1 0-10	xu1 2 10-20	xu2 1 0-10	xu2 2 10-20	xu2 3 20-30	xu3 1 0-20	xu3 2 20-30
Shatter	4	1	8	3	-	16	4
Flakes	12	3	31	7	2	29	6
Core	-	-	-	-	-	-	1
Notch/Ut. Shatter	-	-	-	1	-	-	-
Ret./Ut. Flake	1	-	1	2	-	-	-
Ret./Ut. Blade	-	-	1	-	-	-	-

Table 6.34. (cont').

Test Unit Level (cm)	xu4 1 0-10	xu4 2 10-20	xu4 3 20-30	xu5 1 0-20	xu6 1 0-10	xu6 2 10-20
Shatter	8	9	2	73	28	19
Flakes	16	18	9	142	39	67
Potlids	-	1	-	1	-	1
Biface Frag.	-	-	-	1	-	-
Notch/Flake	-	-	-	1	-	-
Notch/Ut. Flake	1	-	-	1	-	-
Ret./Ut. Flake	-	-	-	15	-	-
Ret./Ut. Blade	-	-	-	1	-	-
Ret./Ut. Shatter	-	-	-	1	-	-
Ret./Ut. Chunk	-	-	-	-	-	1

Table 6.34. (cont').

Test Unit Level (cm)	xu7 1 0-20	xu7 2 20-30	xu8 1 0-10	xu8 2 10-20	xu8 3 20-30	xu9 1 0-10	xu9 2 10-20
Shatter	12	3	6	7	8	1	-
Flakes	26	3	29	24	13	-	-
Notch/Ut. Flake	-	-	1	-	-	-	-
Ret./Ut. Flake	2	2	2	1	2	-	-

Table 6.34. (cont').

Test Unit Level (cm)	xu10 1 0-10	xu10 2 10-20	xu11 1 0-10	xu11 2 10-20	xu12 1 0-10	xu12 2 10-20
Shatter	2	1	7	3	7	9
Flakes	1	-	14	5	9	3
Cores	-	-	-	-	1	-
Notch/Ut. Core	-	-	-	-	1	-
Ret./Ut. Shatter	-	-	1	-	1	-

Artifacts in all units decreased in frequency from the upper to the lower levels. The presence of some artifacts below the plow zone could be attributed to dislocation caused by their falling down dessication cracks. Vertically oriented flakes and chips attesting to this disturbance were recorded in several units. Given the long stability of the soil on the interfluve in the site area as evidenced by the presence of the Paleoindian point fragment found by IRI, no deep burial of intact cultural deposits was anticipated. Nonetheless, a trench was excavated by backhoe in the southern portion of the site where the deepest soil development occurred. No cultural materials were noted in that trench, which reached bedrock at a depth of less than one meter.

Assemblage

The artifact assemblage from this site consists entirely of lithic material, including 713 pieces of debitage, 40 informal tools (notched flakes, retouched/utilized flakes, etc.) and a single biface fragment. While the high percentage of debitage and the near absence of formal tools might be interpreted as an indication of quarrying activities, the number of primary flakes (which one would expect to be high at a quarry site) is

actually quite low. On the basis of this lithic assemblage, without any diagnostic artifacts, no inference of the cultural affiliation of the site can be drawn.

Interpretations

A lithic assemblage that consists of very few formal tools, a moderate amount of fortuitously used flake tools, and a high percentage of tertiary flakes (see chapter 7) is reflective of short-term occupation. However, the great abundance of lithic material at the site probably represents periodic reoccupations. The topographic setting of 14DO137, on a high ridge with an excellent overview of the surrounding terrain, suggests it served as a hunting station. The lithic material, then, probably resulted from the chipped-stone tool production and maintenance activities of the hunters on watch for game in the area.

Recommendations

This site does present some intriguing research potential for archaeologists interested in prehistoric settlement patterns. The focus has generally been on lowland settlement sites and upland, specialized activity sites such as 14DO137 have rarely been investigated. However, the lack of diagnostic artifacts precludes an accurate interpretation of the role this site played in any past settlement system. While we can interpret the activities that occurred, we cannot determine when they took place. The presence of a single fragment of a Paleoindian point, while of importance for indicating the presence of humans in the study area during the late glacial period, cannot be used to date the lithic assemblages recovered by IRI or Kaw Valley Engineering during their excavations. The surface on which that artifact occurred has been stable for so long that any prehistoric period (or several of them) could be represented by the entire lithic assemblage. A direct, undisturbed association of the Paleoindian point with the other cultural material at the site cannot be demonstrated. It may well represent a point lost during an isolated hunting incident in the site area prior to the more intensive utilization of the site as a hunting station during a later period.

Because of the lack of culturally diagnostic material, the shallowness of the deposits, and the extensive disturbance of the terrain by terracing, this site is not considered eligible for the National Register.

14DO138

Name: Unnamed
Recorded: IRI, 1976
Cultural Affiliation: Plains Woodland
Topographic Setting: Upland
Elevation: 268-274m msl
Parent Material: Limestone & Shale
Slope: 7-8%
Drainage: Rock Creek

Previous Investigations

The only prior investigation at this site occurred when it was surveyed by Iroquois Research Institute in 1976 (Chambers et al. 1977:129-130). At that time only four lithic artifacts were recovered, including a biface fragment, flake knife, knife or point midsection, and projectile point base. The horizontal extent of the site was estimated to be about 5,000 m^2. No cultural affiliation could be assigned to the site.

Geomorphic Setting

Site 14DO138 is located on the shoulder of a hillside in Rock Creek valley, at an elevation of approximately 268-274 m msl. Soils at 14DO138 are the Vinland-Martin silty clay loams. This complex of strongly sloping soils occurs on side slopes below limestone and sandstone formations. The Vinland and Martin soils are loamy Mollisols formed in material weathered from loamy shale. In a representative profile (Table 6.35), the A horizon is brown silty clay loam about 18 cm thick. The Bt horizon is dark yellowish brown, firm silty clay loam about 8 cm thick. The underlying material is reddish brown silty clay loam with many shale fragments.

Table 6.35. Description of Soil Profile in Unit 3 at 14DO138.

Depth (cm)	Soil Horizon	Description
0-18	A	Brown (10YR4/3) silty clay; moderate fine and medium granular structure; friable; noneffervescent; gradual smooth boundary.
18-26	Bt	Dark yellowish brown (10YR4/4) silty clay loam; common medium distinct yellowish red (5YR4/6) mottles; moderate fine subangular blocky structure; thin discontinuous clay films on ped surfaces; approximately 10% shale fragments; noneffervescent; gradual smooth boundary.
26-30+	C	Reddish brown (5YR4/4) silty clay loam; common fine and medium faint yellowish red (5YR4/6) mottles; massive; firm; approximately 30% shale fragments; noneffervescent.

The potential for deeply buried cultural materials at 14DO138 is very low. Shoulder slopes are areas of net erosion and therefore deep burial is precluded. Cultural materials at the site are not likely to occur below the A horizon.

1986 Investigations

This site was investigated on September 1 and access to the isolated, wooded area required the use of a canoe. Surface visibility in the site area was poor to fair. Survey revealed a small concentration of lithic debris and a single corner-notched projectile point (Fig. 6.20b [p. 117]) in an area of about 750 m^2 (Fig. 6.24). A hiking trail roughly bisects the site area. A datum was established on the site and away from the trail and four test units were placed in areas of lithic occurrence. Unit 1 was placed on the trail, where the projectile point was found.

Excavation revealed an abundance of lithic material, which is unusual for a site of this small size (Table 6.36). However, the artifacts decreased in frequency in all units and none was found below the A horizon. Perhaps the best example of the confinement of the cultural material to the A horizon was a corner-notched projectile point (Fig. 6.20c [p. 116]) found in situ in the northwest profile of Unit 3 at the interface of the A and Bt horizons (Fig. 6.25). This artifact was found lying horizontally on the surface of the lower horizon. In Unit 2, weathered bedrock was encountered in Level 3 (20-30 cm below surface). Extensive root disturbance was noted throughout Unit 1, which may explain the presence of some lithic material in the lowest level (20-30 cm below surface). Weathered parent material was encountered in that level. Two biface tips and several pieces of debitage were found in Unit 4, although again a noticeable drop in frequency was noted in the lower part of the A horizon (Table 6.36).

Table 6.36. Cultural Material Recovered from 14DO138.

Test Unit Level (cm)	xu1 1 0-10	xu1 2 10-20	xu1 3 20-30	xu2 1 0-10	xu2 2 10-20	xu2 3 20-30
Shatter	14	16	5	10	3	-
Flakes	84	77	14	23	8	-
Cores	-	-	-	-	1	-
Proj. Pts.	1	-	-	-	-	-
Notch/Flake	-	-	1	-	-	-
Notch/Ut. Chunk	-	-	-	1	-	-
Ret./Ut. Flake	-	1	-	-	-	-
Ret./Ut. Chip	1	-	-	-	-	-

14 DO 138

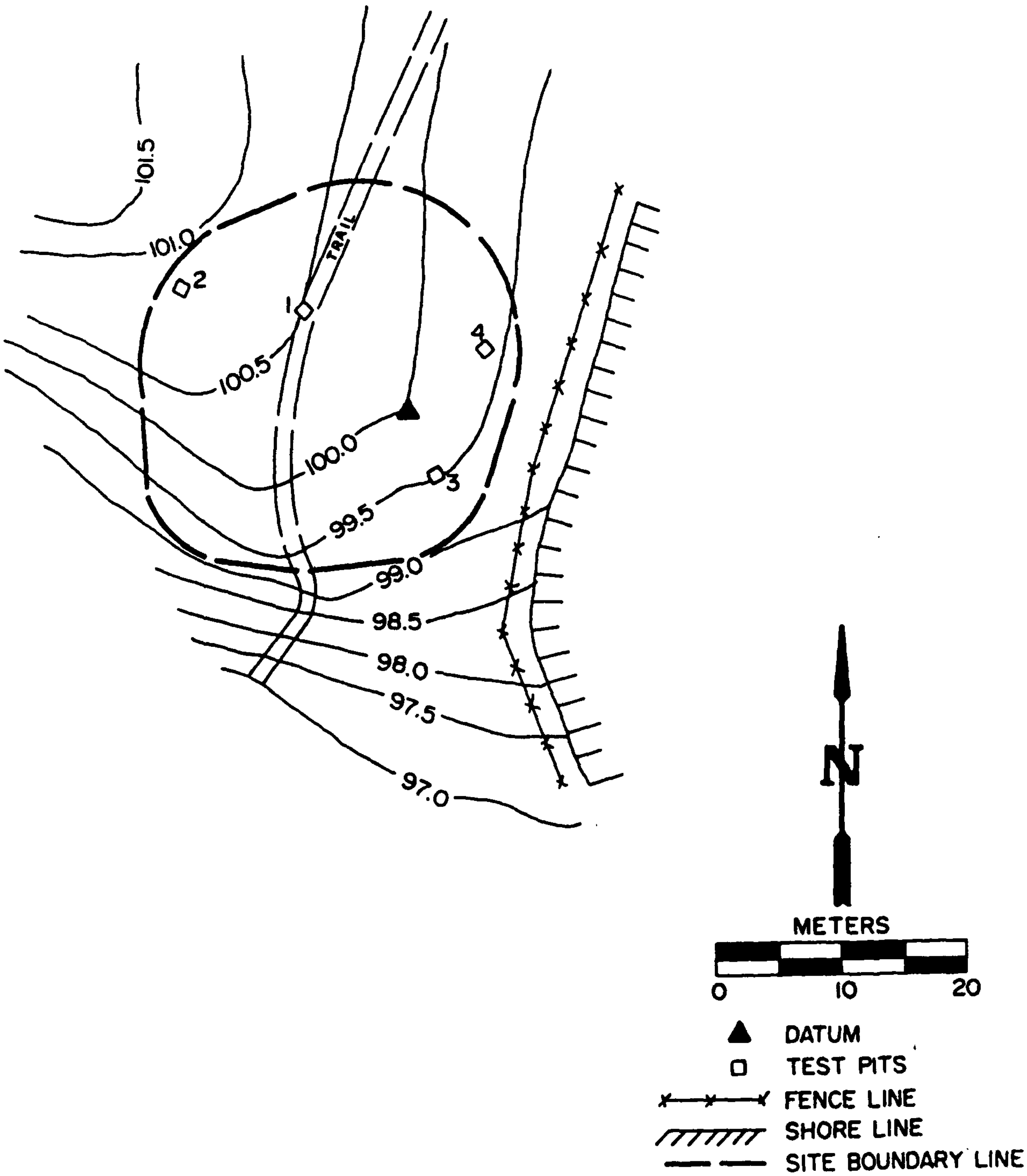


Figure 6.24. Map of 14DO138 showing location of test units.

14DO138

UNIT 3 NORTHWEST PROFILE

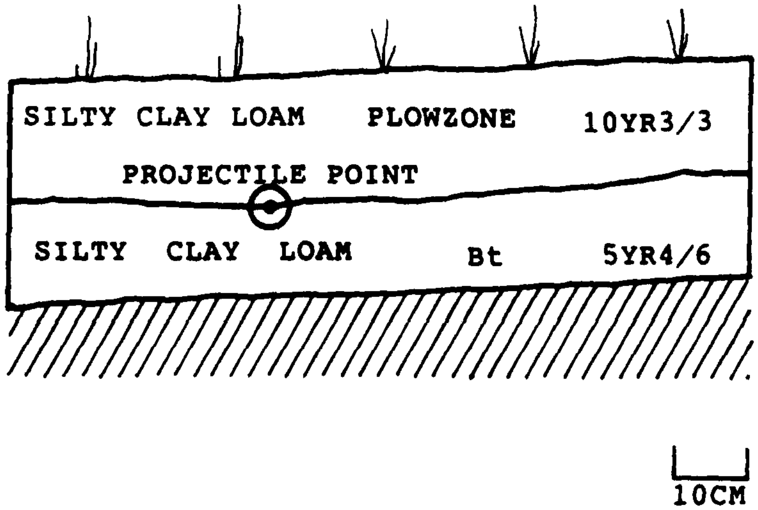


Figure 6.25. Northwest profile of Unit 3 at 14DO138 showing location of projectile point (see Fig. 6.20c) at interface of A and B horizons. Point was found lying horizontally on the surface of the B horizon.

Table 6.36. (cont').

Test Unit Level (cm)	xu3 1 0-10	xu3 2 10-20	xu3 3 20-30	xu4 1 0-10	xu4 2 10-20
Shatter	38	31	1	9	2
Flakes	129	160	6	20	8
Proj. Pts.	-	1	-	-	-
Biface Frag.	3	-	-	-	-
Ret./Ut. Flake	2	1	-	1	-
Ret./Ut. Flake/Chip	2	-	-	-	-
Ret./Ut. Blade	-	1	-	-	-
Ret./Ut. Shatter	-	-	-	1	-

Assemblage

The artifact assemblage from this site includes 647 pieces of debitage, 12 informal chipped stone tools, and five formal chipped stone tools. No ceramics were found. The corner-notched projectile points may be indicative of a Woodland cultural affiliation, although this identification should be considered tentative.

Interpretation

The high density of lithic debris, presence of a low number of hunting tools, lack of ceramics, and small site size suggest 14DO138 functioned as a place of limited activity. As in the case of 14DO137, this site may be interpreted as a hunting camp.

Recommendations

This site, although relatively rich in lithic material, has been disturbed by root action and slope erosion, which probably accounts for the lower frequency of artifacts in lower levels of some units. The site has been subject to pedestrian and motorbike traffic that has undoubtedly taken some toll on its integrity. It is suggested that this site does not possess sufficient research potential or significance to make it eligible for the National Register of Historic Places.

14DO141

Name: Unnamed
Recorded: IRI, 1976
Cultural Affiliation: Plains Village
Topographic Setting: Upland
Elevation: 280-287m msl
Parent Material: Limestone & Shale
Slope: 2-3%
Drainage: Deer Creek

Previous Investigations

No investigations have occurred at this site since it was first recorded by Iroquois Research Institute in 1976 (Chambers et al. 1977:136). Survey then revealed only 55 flakes from 18 surface collection units. Two shallow (20 cm) one meter square test pits were excavated; one was sterile and the other contained only three flakes. The estimated extent of the site was 1500 m^2 (30m x 50 m). No cultural affiliation could be assigned to the site. It was not recommended for further investigation.

Geomorphic Setting

Site 14DO141 is located on the shoulder of a hillside in Deer Creek valley, at an elevation of approximately 99.5 to 104.0 meters MSL. The soil at 14DO141 is the Oska silty clay loam. This sloping soil is formed in residuum from limestone and shale. In a representative profile (Table 6.37), the Ap horizon is very dark grayish brown silty clay loam about 20 cm thick. The subsoil is dark brown and dark reddish brown, very firm silty clay. Bedrock is usually at a depth of only 100 to 150 cm below the surface of the Oska soil. Limestone and shale were observed in shallow outcrops along the western fringe of the site.

Table 6.37. Description of Soil Profile in Unit 5 at 14DO141.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR3/2) silty clay loam, brown (10YR5/3) dry; moderate medium granular structure; friable; noneffervescent; abrupt smooth boundary.
20-26	BA	Dark brown (10YR3/3) silty clay; common fine distinct dark brown (7.5YR3/4) mottles; moderate fine subangular blocky structure; very firm; thin discontinuous clay films on ped surfaces; noneffervescent; clear smooth boundary.
26-38+	Bt	Dark reddish brown (5YR3/4) heavy silty clay; few faint strong brown (7.5YR4/6) mottles; strong fine and medium subangular blocky structure; very firm; few fine faint dark brown (10YR3/3) coatings on ped surfaces; few fine iron and manganese concretions; noneffervescent.

The potential for deeply buried cultural materials at 14DO141 is very low. Shoulder slopes are areas of net erosion and therefore deep burial is precluded. Cultural materials at the site are not likely to occur below the BA horizon.

1986 Investigations

This site was investigated on July 17 and 21-22. Survey of the site area, the western part of which was in soybeans and the eastern margin in milo, revealed artifact clusters and some formal tools over an area of about 12,500 m^2 (184 m north-south and 68 m east-west). These were pin-flagged and the locations of the latter were mapped with reference to a datum, which was established on the western edge of the field near the treeline (Fig. 6.26; Table 6.38).

Table 6.38. Surface Artifacts from 14DO141 Shown on Figure 6.26.

Artifact 1	Biface
Artifact 2	Biface
Artifact 3	Straight-Stemmed Projectile Point (Fig. 6.20e [p. 117])
Artifact 4	End Scraper (Fig. 6.20f)
Artifact 5	Unnotched Arrow Point (Fig. 6.20g)

Five excavation units were placed in areas of artifact concentration. Units 1 and 2 (contiguous), 3 and 5 were placed on the lower portion of the slope and in a north-south orientation. The remaining pit, Unit 4, was placed in the milo field, above the lowest artificial terrace in the site area. Excavation of all units revealed the shallow nature of the cultural deposits (Table 6.39). Indeed, in Unit 1 limestone bedrock was reached in the lower level (15-25 cm below surface) demonstrating the extent of erosion in the site area. Artifacts were found in all units, although Unit 4 contained only a single flake in the plow zone. All units were similar in that the quantity of material dropped of drastically below the plow zone. Natural cherts were noted throughout the excavation units.

Table 6.39. Cultural Material Recovered from 14DO141.

Test Unit Level (cm)	Sur-face	xu1 1 0-15	xu1 2 15-25	xu2 1 0-15	xu3 1 0-17	xu3 2 17-27
Shatter		18	3	5	8	-
Flakes		8	-	4	17	-
Proj. Pts.	2	-	-	-	-	-
Biface	2	-	-	-	-	-
End Scraper	1	-	-	-	-	-

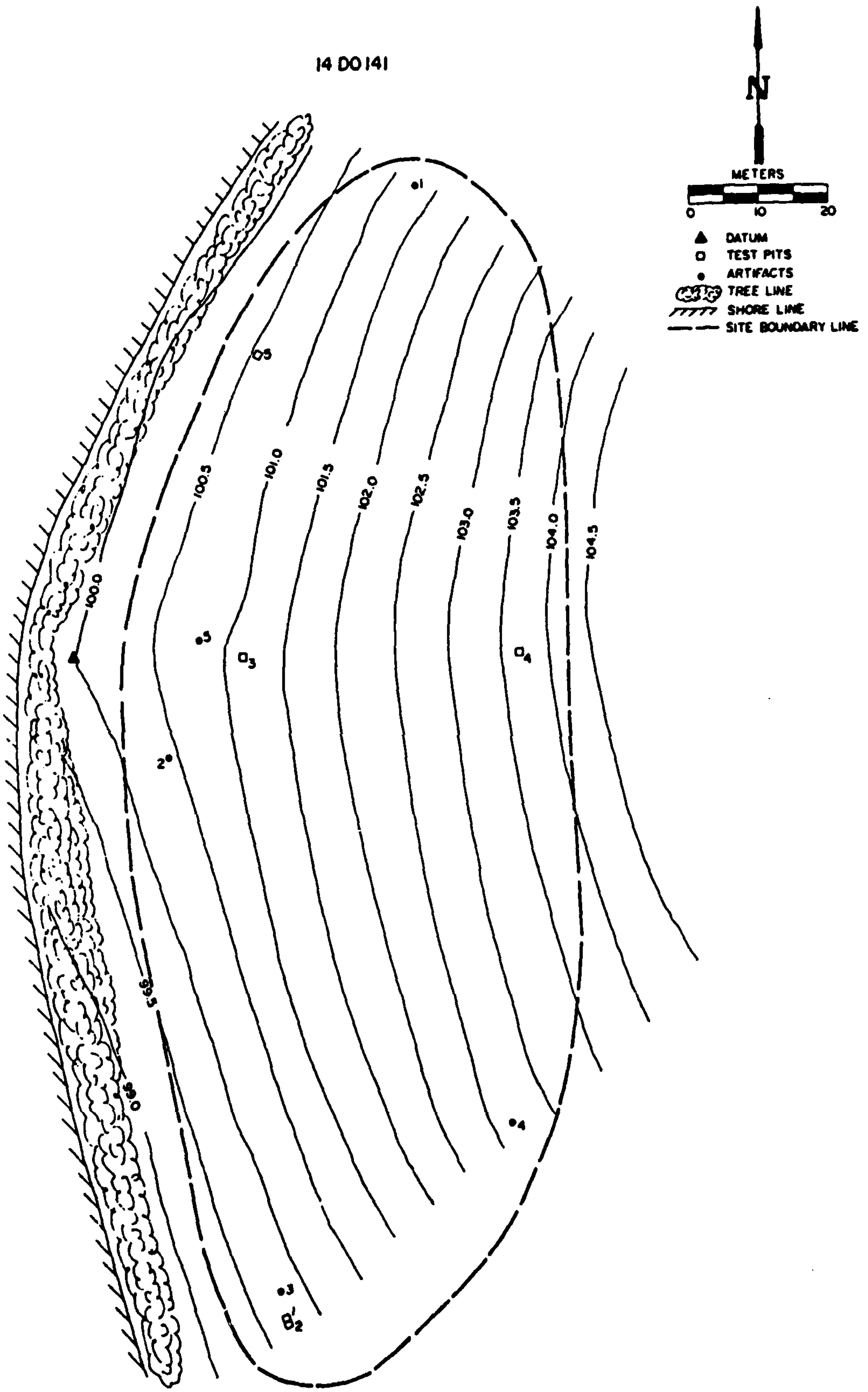


Figure 6.26. Map of 14DO141 showing location of test units and surface finds.

Table 6.39. (cont').

Test Unit Level (cm)	xu4 1 0-15	xu4 2 15-25	xu5 1 0-20	xu5 2 20-30
Shatter	-	-	4	2
Flakes	1	-	29	1
Proj. Pts.	-	-	1	-
Biface	-	-	1	-
Notch/Flake	-	-	1	-
Ret./Ut. Chunk	-	-	1	-

Assemblage

The acquired artifact assemblage consists of only 108 items. All of this material is lithic; no ceramics were found. The straight-stemmed projectile point base found on the surface (Fig. 6.20e [p. 116]) may be indicative of an Archaic occupation, although this point type was also utilized during the Woodland and Plains Village periods. The triangular unnotched arrow point from the surface (Fig. 6.20g) is a typical Plains Village artifact. The basal portion of a corner-notched dart point found in Unit 5 (Fig. 6.20d) may be indicative of a Woodland component, although such tools are known to occur in both earlier and later periods as well. Few informal tools were found; they include a notched flake and a retouched/utilized piece of natural chert.

Interpretations

Given the sparse lithic assemblage from this site, little can be said of it. The few projectile points are indicative of hunting activities but the cultural ambiguity of some of them precludes determining when most of the cultural material with which they are associated was deposited. A single scraper is indicative of hide processing and the few informal tools suggest a task such as woodworking. Debitage, of course, reflects tool manufacture and processing.

Recommendations

14DO141 has been subjected to extensive erosion through slopewash. A portion of the site area has been disturbed by the construction of an artificial terrace. The soils of the site area are residual and shallow, denying any possibility of deeply buried sites. For these reasons, the site is considered ineligible for the National Register.

14DO142

Name: Unnamed
Cultural Affiliation: Unknown
Topographic Setting: T-1 terrace
Parent Material: Alluvium
Drainage: Elk Creek

Recorded: IRI, 1976
Elevation: 271-273 m msl
Slope: 1%

Previous Investigations

This site was recorded and surveyed by Iroquois Research Institute in 1976, at which time only the margins of the cultivated field in which it occurs could be inspected (Chambers et al. 1977:137-138). A small sample of cultural material was found, including Scallorn-like arrow point midsection, utilized flakes, core fragments, and debitage. Many pieces of natural chert were also noted in the site area. No cultural affiliation was assigned to the site, although the arrow point is suggestive of a Plains Woodland affiliation.

Geomorphic Setting

Site 14DO142 is located on the T-1 terrace in Elk Creek Valley at an elevation of 271 to 273m msl. The soil at 14DO142 is the Reading silt loam. This soil is a Mollisol formed in loamy alluvium on a gently sloping surface. Table 6.40 provides a detailed description of the soil profile exposed in Unit 1. The soil is characterized by a thin silt loam Ap horizon above an 8-cm-thick very dark gray A horizon. The A horizon overlies a very dark grayish brown silt loam BA horizon that gradually gives way to a dark brown silty clay loam Bt horizon. The Bt horizon is characterized by moderate medium subangular blocky structure.

The age of the T-1 fill at 14DO142 is not known. However, based on radiocarbon dates and archaeological evidence from other sites in the Wakarusa River drainage system, late Archaic and later prehistoric sites may be on or at shallow depths below the T-1 surface at 14DO142.

Table 6.40. Description of Soil Profile in Unit 1 at 14DO142.

Depth (cm)	Soil Horizon	Description
0-13	Ap	Very dark grayish brown (10YR3/2) heavy silt loam, dark brown (10YR3/3) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.
13-21	A	Very dark gray (10YR3/1) heavy silt loam, very dark grayish brown (10YR3/2) dry; weak medium granular structure; friable; noneffervescent; gradual smooth boundary.

Table 6.40. (cont')

21-35	BA	Very dark grayish brown (10YR3/2) heavy silt loam, dark brown (10YR3/3) dry; few fine faint dark yellowish brown (10YR4/4) mottles; moderate fine subangular blocky structure; very dark gray (10YR3/1) coatings on some ped faces; shiny surfaces on many ped faces; noneffervescent;
35-40+	Bt	Very dark grayish brown (10YR3/2) silty clay loam, dark brown (10YR3/3) dry; common fine faint dark yellowish brown (10YR4/4) mottles; moderate medium subangular blocky structure; firm; shiny surfaces on many ped faces; thin discontinuous clay films; nonefferescent.

1986 Investigations

This site was investigated on August 25. The field in which the site is located was then in soybeans. Although visibility was somewhat limited, between the rows it was nearly 100%. A thorough survey failed to yield any cultural material on the surface, although several pieces of natural chert were noted. Thus, site boundaries could *not* be determined (Fig. 6.27). Given the limits of the site area provided by IRI (80 m x 100 m), it was decided to place the datum on the north edge of the field just inside the treeline on the adjacent bluff slope and to excavate a general north-south transect of test units through the suggested "center" of the site area (Fig. 6.27).

Excavation revealed only a small quantity of lithic debris of no apparent diagnostic value (Table 6.41). Much of this lithic material is classified as shatter and may be natural chert. However, small quantities of unmodified flaking debris were found in all units. Artifact frequency dropped off in lower levels indicating the shallow nature of the deposits.

Table 6.41. Cultural Material Recovered from 14DO142.

Test Unit Level (cm)	xu1 1 0-20	xu1 2 20-30	xu2 1 0-20	xu2 2 20-30
Shatter	23	1	2	3
Flakes	17	1	8	3

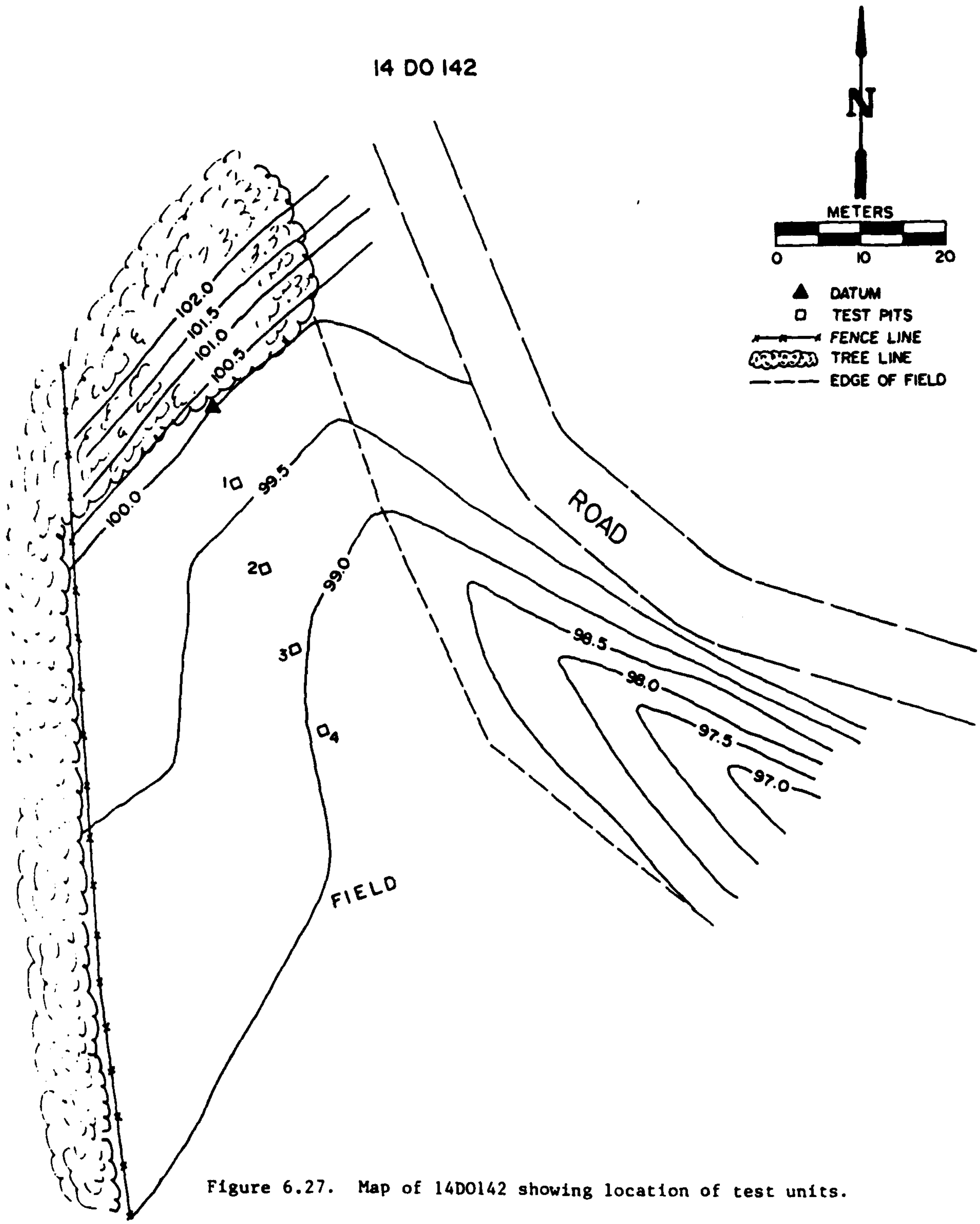


Figure 6.27. Map of 14DO142 showing location of test units.

Table 6.41. (cont').

Test Unit	xu3	xu3	xu4	xu4
Level	1	2	1	2
(cm)	0-20	20-30	0-20	20-30
Shatter	4	-	4	1
Flakes	1	-	-	-

Assemblage

Little can be said about the artifact assemblage from 14DO142. The total count of lithic debris is 69 and none of this is of any diagnostic value. No tools are included in the collection.

Interpretation

The sparse lithic material in an area of relatively abundant natural cherts (weathering out of the nearby bluff slope?) may be indicative of a specialized activity site. The prehistoric assemblage may be the result of the fortuitous exploitation of lithic raw material. Unfortunately, given the lack of culturally diagnostic evidence, the time of this activity cannot be ascertained.

Recommendations

No recommendation of eligibility for the National Register can be supported on the basis of the data recovered from this site during the 1986 investigations. Moreover, the scarcity of artifacts noted during the original survey by IRI also suggests the site has little research value. Neither the quantity nor the quality of cultural material present at 14DO142 is sufficient to warrant consideration for placement on the National Register.

14DO153

Name: Unnamed
Recorded: IRI, 1976
Cultural Affiliation: Unknown
Topographic Setting: T-1
Elevation: 270 m msl
Parent Material: Alluvium
Slope: 1%
Drainage: Wakarusa River

Previous Investigations

The first investigation of this site occurred in 1976 when Iroquois Research Institute conducted a survey. The site was then identified by a "small, discrete concentration of flakes and flaking debris" over an area of 6,250 m^2 (125 m north-south X 50 m east-west; Chambers _et al_. 1977:157). No modified lithic

material was found during this survey and the site was assessed as having only minimal potential for providing any significant information. No cultural affiliation could be assigned to the site.

Geomorphic Setting

Site 14DO153 is located on the T-1 terrace in the Wakarusa River valley at an elevation of 270 m msl. The broad, flat T-1 surface at the site is subject to frequent flooding and concomitant sedimentation. Efforts were made, therefore, to determine the potential for buried prehistoric cultural materials. More specifically, two deep backhoe trenches were excavated in the area of 14DO153 (Fig. 6.28). Table 6.42 provides a detailed description of the soil profile exposed in Trench 1. A weakly developed A/C profile is developed in the upper 45 cm of the silty T-1 alluvium. This surface soil is probably formed in very recent overbank sediment. A buried silty soil with an A/C profile occurs at a depth of 45 to 121 cm below the T-1 surface. This buried soil also may be formed in "post-settlement" alluvium. The 2ACb horizon overlies a thick, black, mollic epipedon (3Ab horizon) of a strongly developed paleosol. The 3Ab horizon gradually gives way to a silty clay loam argillic horizon (3Btb). A soil sample from the upper 15 cm of the 3Ab horizon was radiocarbon dated at 2930 ± 80 years B.P. This date indicates that the T-1 surface was relatively stable at ca. 3000 B.P., and the 3Ab horizon may represent the top of the "pre-settlement" soil.

Table 6.42. Description of Soil Profile in Trench 1 at 14DO153.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR 3/2) heavy silt loam, brown (10YR 4/3) dry; weak fine granular structure; friable; noneffervescent; clear smooth boundary.
20-45	AC	Brown (10YR 4/3) heavy silt loam, brown (10YR 5/3) dry; massive and weak very fine granular structure; friable; noneffervescent; abrupt smooth boundary.
45-89	2Ab	Very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; noneffervescent; gradual smooth boundary.
89-121	2ACb	Very dark brown (10YR 2/2) heavy silt loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; friable; noneffervescent; abrupt smooth boundary.

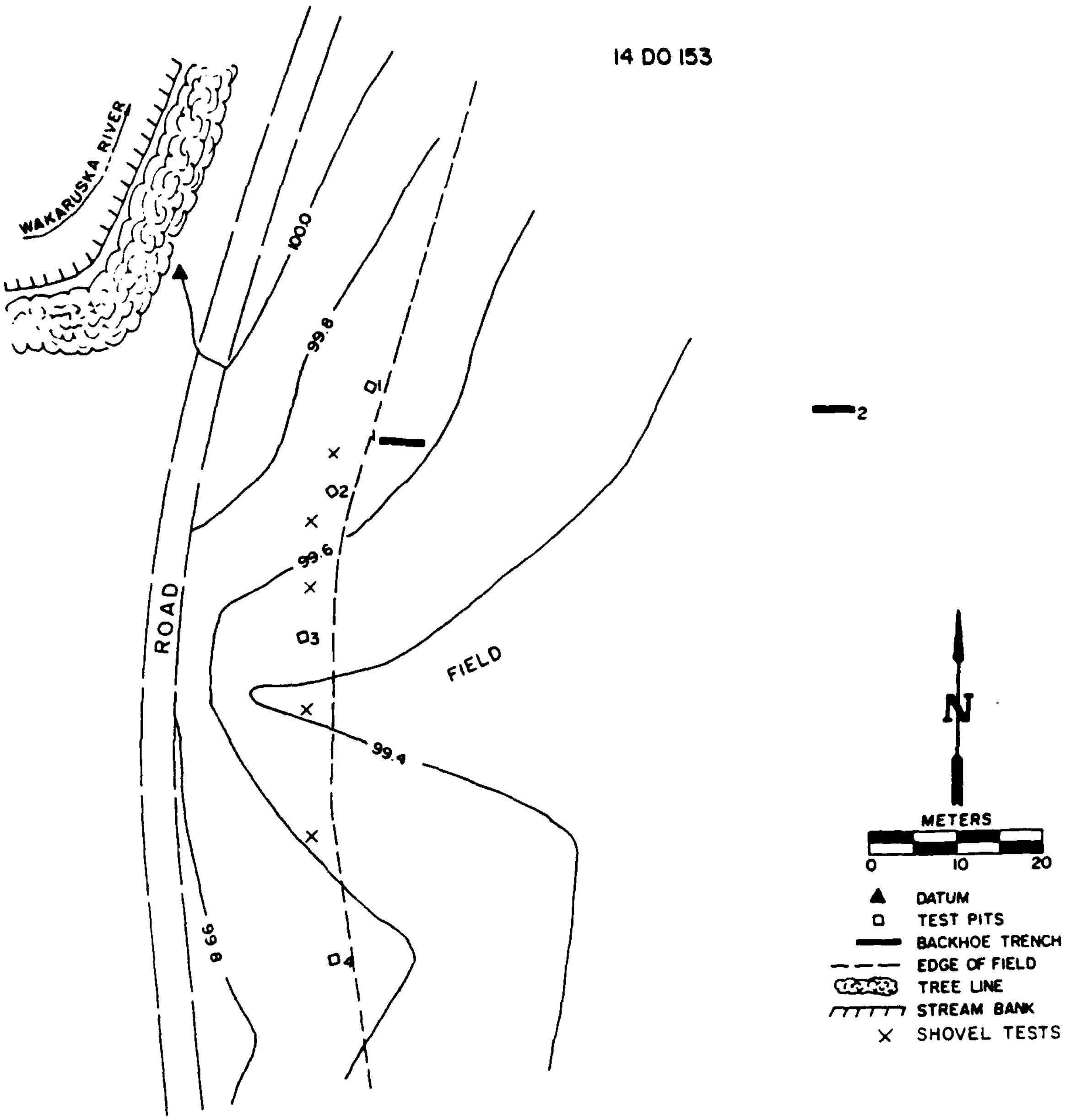


Figure 6.28. Map of 14DO153 showing location of test units and backhoe trench. Site boundaries could not be determined because of the absence of any cultural material at the time of survey.

Table 6.42 (cont')

121-170	3Ab	Black (10YR 2/1) light, silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; firm; noneffervescent; gradual smooth boundary.
170-187	3BAb	Very dark grayish brown (10YR 3/2) silty clay loam, dark brown (10YR 3/3) dry; weak fine subangular blocky structure; firm; common shiny surfaces on ped faces; noneffervescent.
187-240+	3Bt	Dark brown (10YR 3/3) heavy silty clay loam, brown (10YR 4/3) dry; weak medium subangular blocky structure; firm; common very dark grayish brown (10YR 3/2) coatings on ped faces; noneffervescent.

Based on the soil-geomorphic evidence and radiocarbon date from 14DO153, there is potential for deeply buried prehistoric cultural materials in the T-1 fill, especially on or within the 3Ab horizon. The age of the 2Ab horizon is not known, but it is probably less than 150 years old. Thus, prehistoric sites are not likely to be found in the upper meter of the T-1 fill, except in places where recent alluvium has been stripped away by erosion.

1986 Investigations

This site was investigated on August 25 and 26 when both survey and shovel testing in the suggested site area failed to yield any artifact finds. Part of this area was in a grass strip along a gravel road and part of it was in corn. Visibility in the latter area was 100%. Shovel tests were conducted in the grass strip parallel to the corn field and at a distance of about five meters to its west. This transect of shovel tests proved negative. It was decided to establish the datum west of the reported site area, in the trees near the Wakarusa River and to excavate a north-south series of four units along the edge of the corn field that would bisect the site area (Fig. 6.28).

The units were excavated to the following depths: Unit 1, 20 cm; Unit 2, 30 cm (base of plow zone noted at 22-24 cm below surface); Unit 3, 20 cm; Unit 4, 30 cm (base of plow zone noted at 23 cm below surface). None of these units yielded any cultural material. During the excavation of these pits, the crew was visited by a local man, Mr. Francis Anderson, who knew the history of the site area. He informed us that the terrain at that locality is notorius for periodic flooding. It is possible that the sparse cultural material noted by IRI during the original survey could have been washed in from another area following one of these episodes. A second possibility is the exposure of

this material caused by any scouring action during flooding. This alternative assumes the presence of buried materials.

Testing for deeply buried cultural materials at the site was accomplished by excavation of two trenches (see above). The walls of these trenches were closely inspected for artifacts or features, especially in the upper portions of the buried soil horizons. No cultural materials were discerned.

Assemblage/Interpretations

No artifacts were found during the 1986 investigations, hence, no cultural interpretations are possible.

Recommendations

Given the absence of cultural material noted during the 1986 investigations despite shovel testing, test excavation and deep trenching, no significance is attached to this site. The possibility exists, however, that the few artifacts recovered during the original survey by IRI were caused by the effects of scouring on the buried surfaces in the site area. This hypothesis was tested with negative results. On the basis of these findings, the site is not considered eligible for the National Register.

14DO155

Name: Unnamed
Recorded: IRI, 1979
Cultural Affiliation: Pomona variant?
Topographic Setting: Upland
Elevation: 101.3 m msl
Parent Material: Limestone & Shale
Slope: 2-3%
Drainage: Deer Creek

Previous Investigations

Iroquois Research Institute conducted controlled surface collections and shovel tests at this site in 1979 (Nathan 1980: 143-147). These investigations resulted in the recovery of 121 artifacts, some of which are indicative of a Plains Woodland affiliation. The extent of the site area was estimated as 6,325 m^2 (120 m north-south X 60 m east-west). Lithic material recovered included projectile points, point fragments, a drill, point preform, biface fragments, scraper, chopper, utilized flakes, core, and debitage. Corner-notched points and four sherds with grit temper were suggested to indicate a Plains Woodland (Grasshopper Falls phase?) occupation.

Geomorphic Setting

Site 14DO155 is located on the shoulder of a hillside in Deer Creek valley, at an elevation of approximately 100.0 to 102.5 meters. The soil at 14DO155 is the Oska silty clay loam. This sloping soil is formed in residuum from limestone and shale. In a representative profile (Table 6.43), the A horizon

is dark brown silty clay loam about 20 cm thick. The subsoil is dark brown and strong brown, very firm silty clay. Bedrock is usually at a depth of about 100 to 150 cm below the surface of the Oska soil. Limestone and shale were observed in shallow outcrops along the western fringe of the site.

Table 6.43. Description of Soil Profile in Unit 4 at 14DO155.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Black brown (10YR3/3) silty clay loam, brown (10YR5/3) dry; moderate fine granular structure; friable; noneffervescent; abrupt smooth boundary.
20-31	BA	Dark brown (10YR3/3) silty clay; common fine distinct dark brown (7.5YR3/4) and strong brown (7.5YR4/6) mottles; weak fine subangular blocky structure; firm; thin discontinuous clay films on ped surfaces; noneffervescent; clear smooth boundary.
31-51+	Bt	Strong brown (7.5YR4/6) silty clay; common fine distinct dark reddish brown (5YR3/4) mottles; strong fine and medium subangular blocky structure; very firm; common dark brown (10YR3/3) coatings on ped surfaces; noneffervescent.

Most of the area of 14DO155 has experienced soil erosion due to cultivation of steep slopes. Soil profiles exposed in Test Units 2 and 3 show that the Bt horizon is less than 4.5 cm beneath the land surface. The shallow Bt is due to deflation of the A horizon by wind and water erosion. Surface runoff has transported sediment off the hillside and into the southwest corner of the site, where some of it has been trapped behind a stone wall. Approximately 17 cm of stratified slopewash was exposed in Unit 1 (Table 6.43).

The potential for deeply buried cultural materials _in situ_ at 14DO155 is very low. As noted above, most of the hillside is an area of net erosion. However, small artifacts may have been removed from the land surface by runoff and subsequently buried in slopewash at the southwest corner of the site.

1986 Investigations

This site was investigated on July 22-23, and 25. It was surveyed and the boundaries and artifact clusters pin-flagged. The extent of the site was determined to be ca. 146 m northeast-southwest and 85 m north-south. This area is neither oval nor

oblong, like most sites in the project area, rather its boundaries seem to have been dictated by the slope of the terrain. The site area covers an estimated 8,200 m^2 (Fig. 6.29). Formal tools and cores found on the surface were piece plotted (Table 6.44).

Table 6.44. Surface Artifacts from 14DO155 shown on Figure 6.29.

Artifact 1	Core
Artifact 2	Biface Fragment
Artifact 3	Biface Fragment
Artifact 4	Distal-Lateral Scraper
Artifact 5	Retouched/Utilized Core
Artifact 6	Biface Fragment

Datum was established on the edge of the field near the southwest corner of the site area. Five test units were defined in areas of artifact concentration with respect to this reference point (Fig. 6.29). Excavation revealed a large quantity of lithic material and small sample of pottery (Table 6.45). With one exception (Unit 1), all units were characterized by a distinctive drop-off in artifact frequency from the upper levels (plow zone) to the lower levels. In fact, lower levels were nearly sterile of cultural material, demonstrating the shallow nature of the deposits at this site. Unit 1, however, is unique in the reversal of this cultural stratigraphy. In this unit the

Table 6.45. Cultural Material Recovered from 14DO155.

Test Unit Level (cm)	Sur-face	xu1 1 0-10	xu1 2 10-20	xu1 3 20-30	xu1 4 30-40	xu2 1 0-20	xu2 2 20-30
Shatter	-	-	6	21	19	66	6
Flakes	-	-	11	36	66	195	12
Potlids	-	-	-	-	-	1	-
Cores	2	-	-	-	-	-	-
Biface Frag.	3	-	-	-	-	-	-
D.-L. Scraper	1	-	-	-	-	-	-
Notch/Flake	-	-	1	-	-	-	-
Notch/Ut. Flake	-	-	-	-	1	-	-
Ret./Ut. Flake	-	-	-	1	7	2	1
Ret./Ut. Chip	-	-	-	-	1	1	-
Ret./Ut. Blade	-	-	-	-	-	1	1
Ret./Ut. Shatter	-	-	-	1	1	-	1
Ret./Ut. Core	1	-	-	-	-	-	-

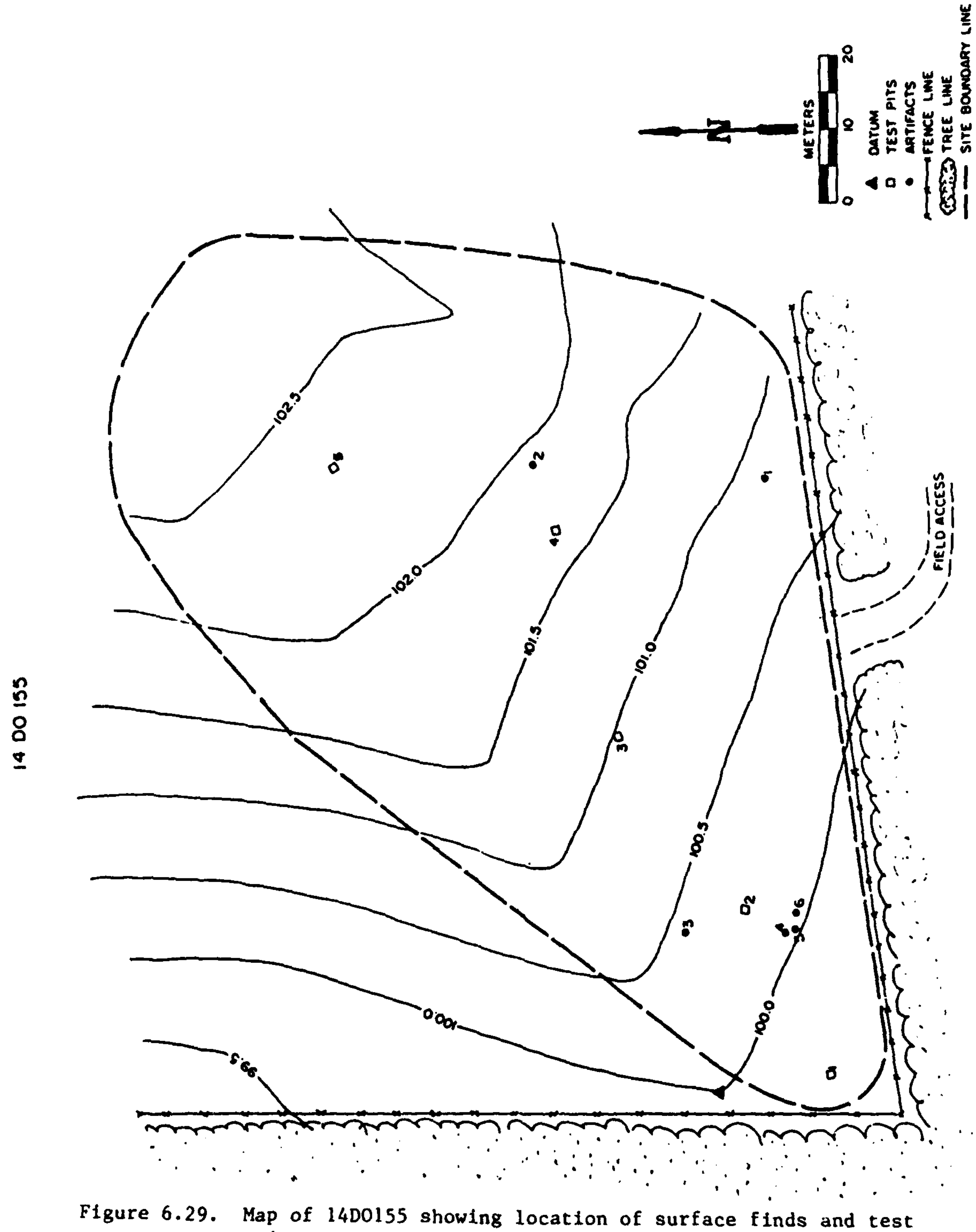


Figure 6.29. Map of 14DO155 showing location of surface finds and test units.

Table 6.45. (cont').

Test Unit Level (cm)	xu3 1 0-10	xu3 2 10-20	xu4 1 0-20	xu4 2 20-30	xu5 1 0-25	xu5 2 25-35
Sherds	-	-	3	-	3	-
Shatter	9	-	36	2	13	1
Flakes	21	-	61	1	20	3
Cores	1	-	2	-	-	-
Biface Frag.	1	-	1	-	-	-
D.-L. Scraper w/ Notch	-	-	-	-	1	-
Notch/Ut. Chunk	-	-	1	-	-	-
Ret./Ut. Flake	1	-	5	-	2	-
Ret./Ut. Flake/Chip	-	-	1	-	-	-
Ret./Ut. Chip	-	-	1	-	-	-
Ret./Ut. Blade	-	-	-	-	1	-
Ret./Ut. Shatter	-	-	1	-	-	-
Ret./Ut. Core	1	-	-	-	-	-

number of artifacts actually increases with depth. This phenomenon can be attributed to the effects of slopewash, artifact transport, and burial. Unit 1 occurs in the extreme southwestern corner of the site area and at its lowest elevation. The slope of the terrain is such that any movement of soils or sediments will be in the direction of that unit. Moreover, treelines that mark the southwestern corner of the field have retarded the downslope movement of eroded material with the result that this material has been deposited in the area of Unit 1. Inspection of the unit profile revealed the presence of telltale depositional lenses attesting to this process. The burial of cultural material in this area of of the site is a local phenomenon that is not characteristic of the rest of the site area.

Assemblage

The recovered assemblage from 14DO155 consists of seven formal tools, 35 informal tools, 576 pieces of unmodified debitage, six potsherds and small amounts of burned limestone. The ceramic material included only one analyzable sherd (see chapter 8) and it is indicative of Pomona variant ware. Unfortunately, this cultural affiliation cannot be substantiated by any diagnostic lithic artifacts. The lithic assemblage is indicative of tool production and maintenance, woodworking and hide processing. The presence of burned limestone may indicate the presence of a hearth or hearths but they have apparently been destroyed by plowing or erosion.

Interpretations

This upland site may be comparable to other Pomona variant sites in similar settings (e.g., 14SH5). Brown (1985) has suggested that the Pomona settlement system entailed seasonal moves between lowland (winter) encampments and upland (spring-fall) occupations. This site may be testimony to that pattern. The relatively sparse amount of ceramic material does not suggest prolonged occupation. The amount of cultural debris reflects a temporary encampment.

Recommendations

The setting of 14DO155 presents some intriguing research potential for understanding currently unknown aspects of the Pomona variant settlement system. Unfortunately, the cultural deposits at the site have experienced severe erosion and lack stratigraphic integrity. Given the vulnerability of the deposits, the relative lack of culturally diagnostic aritifacts or features, and the limited variety of chipped stone tools, we cannot recommend this site for National Register consideration.

14DO157

Name: Unnamed **Recorded:** IRI, 1979
Cultural Affiliation: Plains Woodland (?), Plains Village
Topographic Setting: Colluvial apron **Elevation:** 266-271 m msl
Parent Material: *Colluvium derived from* shale
Drainage: Deer Creek **Slope:** 4%

Previous Investigations

The only prior investigation of this site was its initial survey by Iroquois Research Institute in 1979 (Nathan 1980:147-149). Controlled surface collection and shovel tests indicated a surface extent of 1,050 m^2. Only nine artifacts were found as a result of these investigations. The recovered assemblage included a projectile point fragment of undiagnostic nature, flakes, one body sherd and one rim sherd. This last artifact, a collared and cordmarked sherd, may be the most diagnostic of the site's affiliation. Although IRI suggested the artifact indicated a Plains Woodland occupation, no currently recognized Woodland complex in the region is characterized by collared vessels. Rather, the Plains Village period includes several complexes known for that trait, including the May Brook phase of the Pomona variant (Brown 1985) and the Nebraska phase (Blakeslee and Caldwell 1979).

Geomorphic Setting

Site 14DO157 is located on a colluvial apron at the foot of a hillslope in Deer Creek Valley. The site is at a mean elevation of approximately 269m msl. The soil at 14DO157 is the

Martin silty clay loam. This sloping soil is a Mollisol formed in material weathered from fine textured shale. Table 6.46 provides a detailed description of the soil profile exposed in Unit 1. The soil is characterized be a thin silty clay loam Ap horizon overlying a silty clay Bt horizon. A few fragments of shale occur as colluvium in the argillic horizon.

Table 6.46. Description of Soil Profile in Unit 1 at 14DO157.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; moderate coarse granular structure; firm; noneffervescent; diffuse boundary.
20-30+	Bt	Dark yellowish brown (10YR4/4) silty clay; few fine faint strong brown (7.7YR4/6) mottles; moderate medium subangular blocky structure; common dark brown (10YR3/3) coatings on ped faces; patchy clay films on ped surfaces; few shale fragments; noneffervescent.

Site 14DO157 is in an area of net deposition due to accumulation of colluvium on the footslope. Thus, prehistoric cultural materials may be deeply buried beneath the surface of the colluvial apron. However, shoreline erosion during periods of high water level in Clinton Lake has resulted in the removal of soil and sediment at 14DO157. The lack of thick A and BA horizons in the colluvial soil is evidence of this erosion. Shoreline erosion has undoubtedly affected the horizontal and vertical integrity of cultural materials at 14DO157.

1986 Investigations

This site was investigated on August 4 and 6. The reported site area at that time was dominated by giant ragweed, although the northwestern portion of the area consisted of a grass-covered slope. Visibility was very poor throughout most of the site area and it was necessary to cut transects through the weeds at 10-15 m intervals in order to survey and shovel test it. Shovel tests were dug along these transects at intervals of 25-30 m. All were negative. A datum was established on the grassed slope, above the level of occasional inundation (the site was partially inundated when first visited on May 19 during the preliminary phase of the project; Logan 1986). Four test units were defined (Fig. 6.30). Unit 1 occurred in the only area where flakes were noted. Unit 2 was placed where a

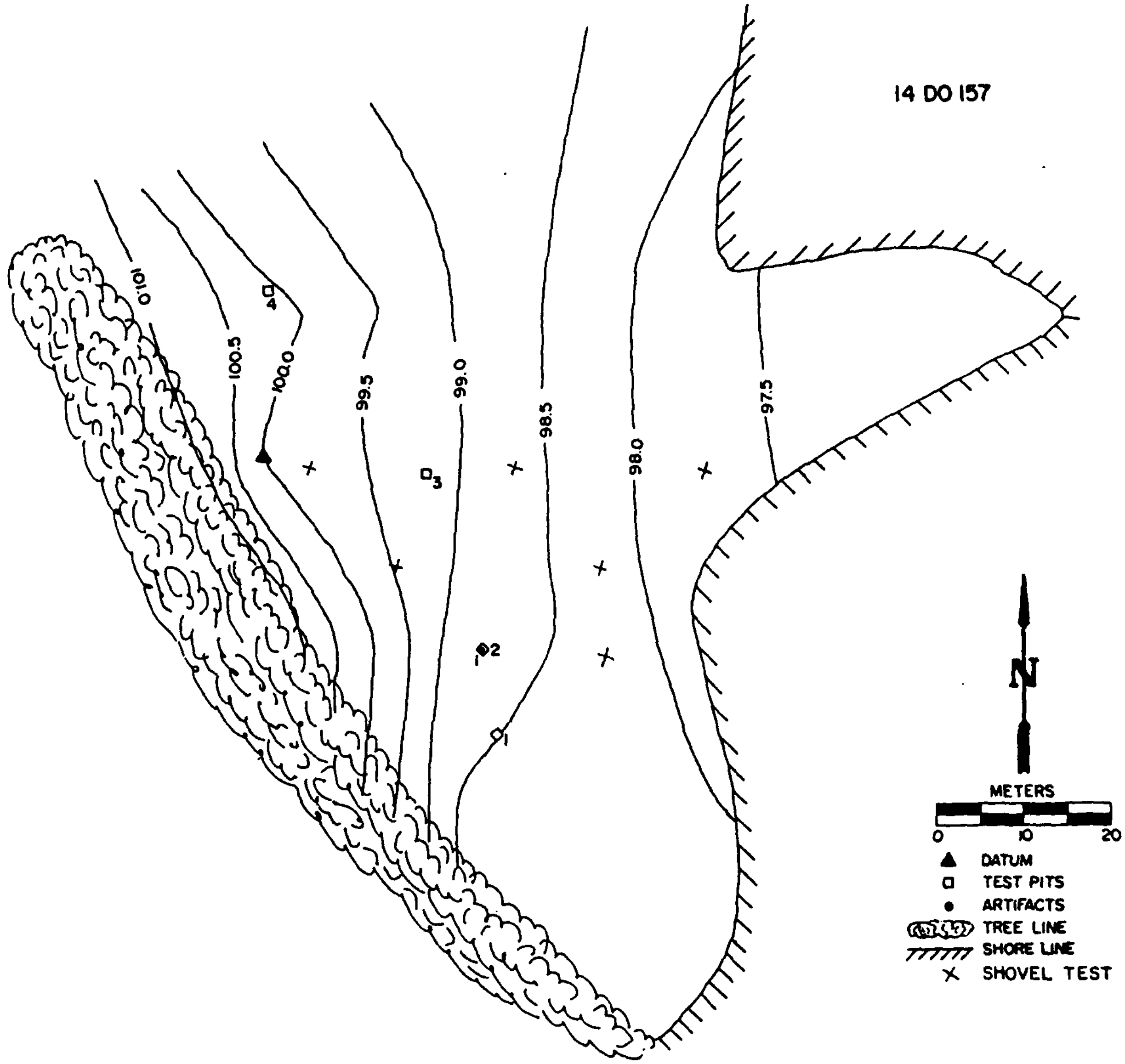


Figure 6.30 Map of 14DO157 showing location of surface find, shard tests and test units. Site boundaries could not be determined due to the scarcity of cultural material.

broken projectile point occurred. Units 3 and 4 were placed to the north of Units 1 and 2. Unit 4was purposefully placed on the slope above the level of periodic inundation in order to determine if intact deposits occurred there.

Excavation of the units resulted in recovery of a relatively small amount of lithic material. This material was found in the upper 20 cm of each unit. However, the A horizon in most of the site area has been stripped by shoreline erosion and proved to be relatively thin. The lowest level (20-30 cm below surface) of Unit 4, the least effected by wave action, was culturally sterile. The only material collected from that level is classified as shatter and, in fact, may well be natural cherts that occur in colluvial apron.

Assemblage

The recovered assemblage consists of 369 items (Table 6.47). This includes one projectile point fragment, 15 informal tools, and 353 pieces of flakes, shatter, and other chipping debris. It was difficult to determine if much of the shatter was cultural or natural in origin (see chapter 7). None of the recovered artifacts is diagnostic of any particular prehistoric period.

Table 6.47. Cultural Material Recovered from 14DO157.

Test Unit Level (cm)	Sur- face	xu1 1 0-10	xu1 2 10-20	xu2 1 0-10	xu2 2 10-20
Shatter		22	42	20	32
Flakes		12	17	12	15
Potlids		-	-	-	1
Projectile Point	1	-	-	-	-
Notch/Flake	-	-	-	-	1
Notch/Shatter	-	-	1	-	-
Ret./Ut. Flake	-	1	1	-	-
Ret./Ut. Shatter	-	-	3	3	1
Ret./Ut. Chunk	-	-	-	1	-

Table 6.47. (cont').

Test Unit Level (cm)	xu3 1 0-10	xu3 2 10-20	xu4 1 0-10	xu4 2 10-20	xu4 3 20-30
Shatter	52	20	11	57	12
Flakes	15	8	3	16	-
Potlids	-	-	1	-	-
Ret./Ut. Flake	1	2	-	-	-

Interpretations

The recovered assemblage is of limited value for interpreting the activities that occurred at the site. Certainly some tool manufacture and/or maintenance was carried out here. Informal tools reflect woodworking. The projectile point fragment is indicative of hunting activities. When these possible activities occurred cannot be determined. The rim sherd found at the site by IRI suggests the site was occupied during the Plains Village period, although the meager amounts of material collected at the site beg more support for such an inference. The low incidence of tools and lack of functional variation in the artifacts seems to indicate a short-term occupation. It is possible that the relative abundance of shatter and chipping detritus is a result of the fortuitous exploitation of natural cherts that occur in the colluvial apron and adjacent slope (cf. 14DO142).

Recommendations

This site is subject to severe erosion caused by wave action. The effects of this process have already destroyed whatever integrity the site may have possessed. The paucity of culturally diagnostic artifacts also lends no support to any possible argument for significance. On the basis of these findings, it is suggested that 14DO157 does not warrant consideration for the National Register.

14DO309

Name: Unnamed **Recorded:** KSHS, 1976
Cultural Affiliation: Archaic, Plains Village
Topographic Setting: Upland **Elevation:** 280-291m msl
Parent Material: Limestone & Shale **Slope:** 1%
Drainage: Wakarusa River

Previous Research

This site was recorded by the Kansas State Historical Society in 1976 (Chambers et al. 1977:158). Materials recovered at that time included retouched and modified flakes. A subsequent survey by Iroquois Research Institute yielded one distal point fragment, one broken biface base and a preform. None of the material was diagnostic of any particular archaeological conplex (Chambers et al. 1977:158). IRI conducted test excavations at the site in 1978 (Nathan 1980:135-141). Six one meter square units were excavated and a total of 245 prehistoric lithic artifacts was recovered. No diagnostic artifacts were found.

Geomorphic Setting

Site 14DO309 is located on the summit of a hill overlooking the Wakarusa River valley, at an elevation of approximately 280

to 291 meters msl. The soil is the Oska silty clay loam, a Mollisol formed in residuum from limestone and shale. The Oska soil at 14DO309 is characterized by a thick, black to very dark grayish brown, silty clay loam A horizon that gradually gives way to a moderately thick, very firm, silty clay Bt horizon. The Bt horizon exhibits strong structural development and dark yellowish brown and dark reddish brown colors. Table 6.48 provides a detailed description of a soil profile exposed in a backhoe trench at the site.

Table 6.48. Description of Soil Profile in Trench 1 at 14DO309.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Black (10YR2/1) silty clay loam, very dark gray (10YR3/1) dry; moderate granular structure; firm; noneffervescent; abrupt smooth boundary.
20-38	A	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; moderate medium granular structure; firm; noneffervescent; abrupt smooth boundary.
38-48	AB	Very dark grayish brown (10YR3/2) silty clay loam, dark grayish brown (10YR4/2) dry; moderate fine subangular blocky structure; firm; few thin discontinuous clay films on ped surfaces; noneffervescent; clear smooth boundary.
48-99	Bt1	Dark yellowish brown (10YR3/4) silty clay, dark yellowish brown (10YR4/4) dry; few fine faint yellowish red (5YR4/6) mottles; strong medium subangular and angular blocky structure; very firm; common thick continuous clay films on ped surfaces; noneffervescent; clear smooth boundary.
99-117	Bt2	Dark reddish brown (5YR3/4) heavy silty clay; strong medium subangular and angular blocky structure; very firm; common shiny surfaces on peds; noneffervescent; clear smooth boundary.
117-127	C	Coarsely mottled dark reddish brown (5YR3/4), reddish brown (5YR4/4), and reddish yellow (7.5YR6/8) heavy silty clay loam; massive; few fine calcium carbonate concretions; common weathered fragments of limestone and shale; noneffervescent; abrupt irregular boundary.
127+	R	Limestone.

The potential for deeply buried cultural materials at 14DO309 is very low. The residual soil is a product of pedogenesis on upland surfaces that have been relatively stable during the Holocene. Because these soils are at the highest position in the landscape, they do not receive sediment from runoff. Thus, burial of cultural materials occurs primarily through bioturbation, littering, and aerosol (loessal) addition. The slow rate of soil accretion resulting from these three processes during the Holocene precludes deep (>50 cm) burial of artifacts.

1986 Investigations

14DO309 is presently a part of a campground maintained by the state of Kansas. The site is in a portion of the campground that has electrical outlets and running water, and is used by campers with trailers and large RV's. Investigations at the site began on July 2 with a pedestrian survey, which located an area of approximately 40,000 square meters of lithic debitage. Also found during the surface survey was the proximal portion of a stemmed projectile point (Fig. 6.31, Artifact 1; Fig. 6.20h [p. 117]) and a small thumbnail scraper (Fig. 6.31, Artifact 2; Fig. 6.20i). Twelve test units were established throughout the site area, with the majority of units in the wooded periphery of the campground. Excavation occurred July 2, 3 and 8.

Test Units 1 through 4 were in the open area of the site and displayed hard, compacted soils. A small amount of debitage was recovered from the upper 20 cm, and very little below that. Excavation ceased at 30 cm below surface, as buried components were unlikely in the residual soil. Test Units 5 through 12, in the wooded area, displayed looser soils, where the ground was protected from compaction by vehicles. Artifacts were slightly more numerous than Units 1 to 4 had shown, but again, dropped off in frequency below 20 cm below surface. Natural cherts were prevalent in these units, and examination of bedrock exposures along the bluff line showed veins and nodules of chert occurring within the limestone.

Assemblage

Although 14DO309 was determined to cover a large area and 12 test units were excavated, the artifact sample is relatively small. Cultural material is limited to 309 lithic artifacts (Table 6.49). Of this sample, 13 pieces (4.2%) are tools. Formal, dignostic tools are the two surface finds noted previously, the stemmed projectile point base and the thumb scraper. A corner-notched point base was brought to the attention of the project personnel during excavations, by a young camper who had proceeded with his own surface collecting. The point was drawn and described in the field notes, and was noted to be made of a non-local chert.

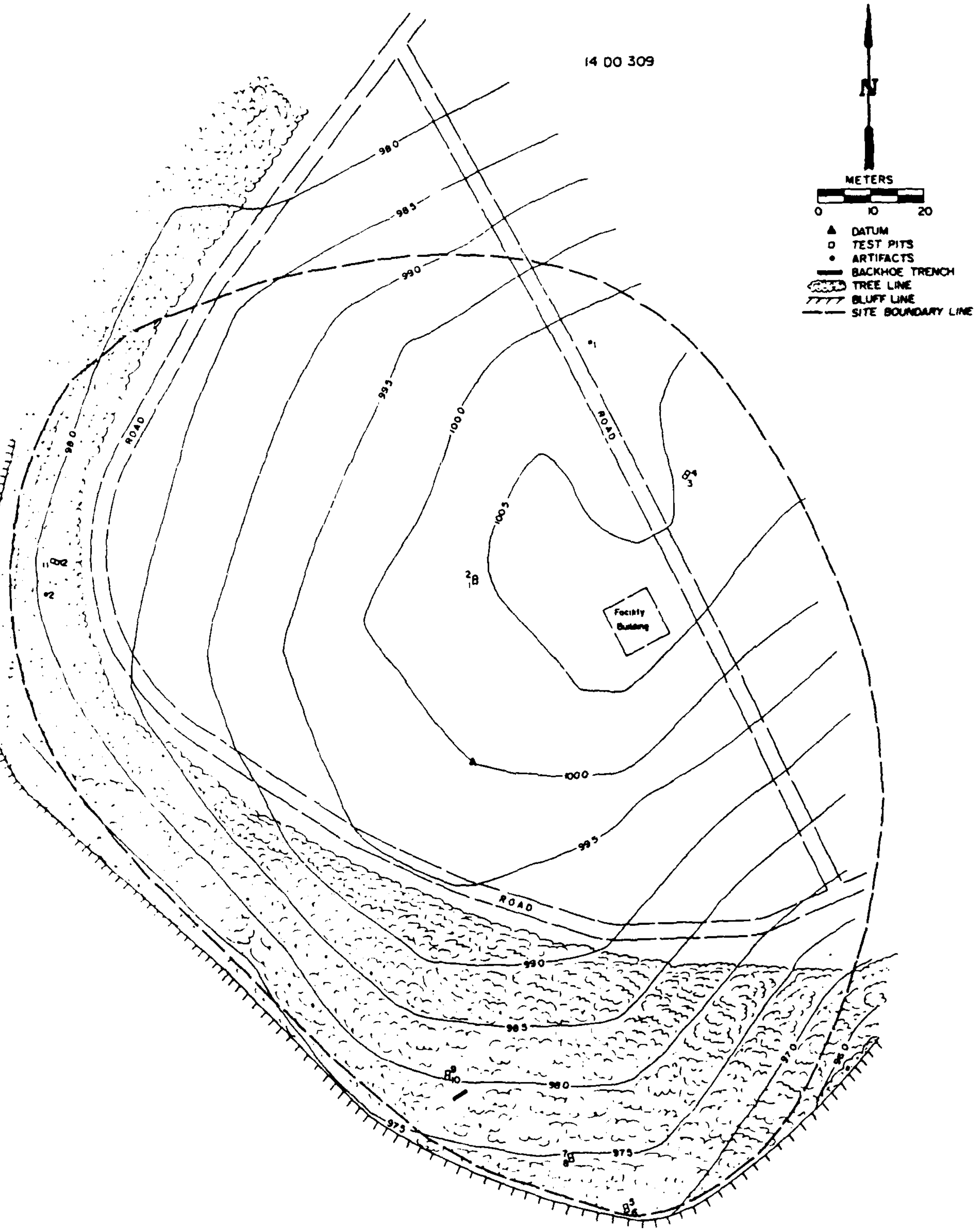


Figure 6.31. Map of 14DO309 showing location of surface finds, test units and backhoe trench.

Table 6.49. Cultural Material Recovered from 14DO309.

Test Unit		xu1	xu1	xu1	xu2	xu2
Level	Sur-	1	2	3	1	2
(cm)	face	0-10	10-20	2 0-30	0-10	10-20
Shatter		4	4	-	1	-
Flakes		5	5	1	1	1
Proj. Pts.	1	-	-	-	-	-
D.-L. Scraper	1	-	-	-	-	-
Ret./Ut. Flake	-	-	1	-	-	-

Table 6.49. (cont').

Test Unit	xu3	xu3	xu4	xu4	xu5	xu5
Level	1	2	1	2	1	2
(cm)	0-10	10-20	0-10	10-20	0-10	10-20
Shatter	10	-	6	7	10	8
Flakes	10	-	17	12	2	1
Notch/Ut. Flake	-	-	-	1	-	-
Ret./Ut. Flake	2	-	1	-	-	-

Table 6.49. (cont').

Test Unit	xu6	xu6	xu7	xu7	xu7	xu7
Level	1	2	1	2	3	4
(cm)	0-10	10-20	0-10	10-20	20-30	30-40
Shatter	29	7	15	5	2	3
Flakes	15	3	7	15	3	4
Cores	1	-	-	-	-	-
Fauna	-	-	1	-	-	1

Table 6.49. (cont').

Test Unit	xu8	xu8	xu8	xu9	xu9	xu10	xu10
Level	1	2	3	1	2	1	2
(cm)	0-10	10-20	20-30	0-10	10-20	0-10	10-20
Shatter	3	6	11	7	-	1	3
Flakes	2	3	2	2	1	1	2
Ret./Ut. Flake	-	-	-	-	-	1	1
Ret./Ut. Shatter	-	-	-	2	-	-	-
Fauna	3	-	-	1	1	-	-

Table 6.49. (cont').

Test Unit	xu11	xu11	xu11	xu11	xu12	xu12	xu12
Level	1	2	3	4	1	2	3
(cm)	0-10	10-20	20-30	30-10	0-10	10-20	20-30
Shatter	1	4	3	2	5	5	3
Flakes	2	-	1	4	1	5	2
Ret./Ut.							
Shatter	-	-	1	1	-	-	-
Fauna	3	-	-	-	-	-	-

All faunal material recovered consists of gastropod shell fragments which were probably intrusive in the prehistoric assemblage. A small amount of burned limestone was present, but it is not possible to attribute this material to a prehistoric occupation.

Interpretations

Site 14DO309 has suffered extensive disturbance, while geomorphological evidence shows that the site is restricted to the topsoil. The state park manager stated that the campground was in cultivation prior to improvements. Creation of the campground required land leveling, which may explain the large site area in relationship to the artifact assemblage.

Nonetheless, certain tentative conclusions can be offered regarding site type. Plattsmouth chert occurs as natural outcrops, forming a predominant portion of the lithic sample, while primary lithic reduction is also shown (chapter 7), indicating a lithic workshop. Presence of the scraper and the corner-notched projectile point, made of exotic cherts, and the stemmed projectile point, made of Plattsmouth chert, suggest occupation by a hunting party. It is not possible to determine whether this represents a single occupation, or repeated occupations, due to the destruction of the site's integrity.

Cultural affiliation is difficult to determine from this assemblage, but it is highly suggestive of Late Archaic or Middle Woodland periods. The two point types occur from Late Archaic to the Plains Village period, but the lack of smaller side-notched and unnotched points indicate an earlier period.

Recommendations

The site area has been extensively disturbed by campground construction and still experiences a considerable amount of pedestrian activity. Cultural deposits, in their original context, must have been relatively shallow, given the geomorphic setting (long stable surface subject to erosion and a very slow rate of soil build-up). Moreover, they are limited in quantity and generally without diagnostic value. For these reasons, the site is not considered eligible for the National Register.

14SH5

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Plains Woodland, Plains Village
Topographic Setting: Upland
Elevation: 274-277m msl
Parent Material: Limestone & Shale
Slope: 2-3%
Drainage: Wakarusa River

Previous Research

The original survey of this site resulted in recovery of a large quantity of lithic material, as well as a sample of ceramic artifacts (Chism 1966:31). The site was also surveyed and a controlled sample of material collected by IRI in 1976 (Chambers et al. 1977:163). At that time the site was treated as one with 14SH6, which occurs opposit a ravine from 14SH5. No additional cultural material of diagnostic nature was found at that time and subsurface testing was recommended.

Geomorphic Setting

Site 14SH5 is located on the shoulder of a hillside in the Wakarusa River valley. Elevation ranges from approximately 274 to 277m msl across the site. The soil at 14SH5 is the Labette silty clay loam, a Mollisol formed in residuum from limestone and calcareous shale. A typical soil profile at 14SH5 is characterized by a thin, silty clay loam Ap horizon above a thick, strongly developed, silty clay Bt horizon (Table 6.50). The lack of a thick A horizon is attributed to soil erosion during historic times. Cultivation has reduced the amount of

Table 6.50. Description of Soil Profile in Unit 1 at 14SH5.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Dark brown (10YR3/3) silty clay loam; moderate medium granular structure; friable; noneffervescent; abrupt smooth boundary.
15-20	BA	Dark brown (10YR3/3) silty clay; few fine faint dark yellowish brown (10YR3/4) mottles; moderate fine subangular blocky structure; firm; few very dark grayish brown (10YR3/2) coatings on ped surfaces; noneffervescent; gradual smooth boundary.
20-30+	Bt	Dark brown (10YR3/3) heavy silty clay; few fine distinct dark yellowish brown (10YR4/4) mottles; strong fine and medium subangular blocky structure; very firm; shiny films on ped surfaces; A horizon material in dessication cracks; thin discontinuous clay films; noneffervescent.

organic matter in the soils, and their structure and aggregation has deteriorated.Consequently, the loose, silty A horizon is susceptible to wind and water erosion.

The potential for deeply buried cultural materials at 14SH5 is very low. Shoulder slopes are areas of net erosion and therefore deep burial is precluded. Cultural materials at the site are not likely to occur below about 20 cm.

1986 Investigations

14SH5 is a diffuse lithic scatter on an upland, overlooking the Wakarusa River valley. Russian thistle, ragweed and woody shrubs indicated previous disturbance, and subsequent excavation showed this as a deflated A horizon. The site was surveyed and excavated on August 26 and 27, with four test units (Fig. 6.32) distributed within the approximately 320 square meters of the site area. Test units yielded a small quantity of artifacts basically confined to the upper 0 to 20 cm, although a few pieces of debitage were found below 20 cm below surface in Units 3 and 4. Dessication cracks were noted on the surface of the site, and evidence within these two units suggests downward transport of artifacts through dessication. Unit 4 displayed a vertically oriented chip at 15 cm below surface, while Unit 3 showed irregular lines of A horizon soils within the matrix of the subsoil at 20 cm below surface. Some natural cherts were also found in the excavations.

Assemblage

Cultural material from 14SH5 included both lithics and ceramics (Table 6.51). The ceramic sample consists of five very small sherds, and was unanalyzable. The lithic sample consists of 96 pieces of debitage, two retouched/utilized pieces of debitage, a biface and two projectile points. One of the projectiles is the distal end of a small point, while the other is basally-notched with one side notch (Figure 6.20k [p. 116]), the notches flaked from opposing faces. The point was apparently too thick along one lateral edge to permit more than one side notch.

Table 6.51. Cultural Material Recovered from 14SH5.

Test Unit Level (cm)	Sur- face	xu1 1 0-20	xu1 2 20-30	xu2 1 0-20	xu2 2 20-30
Sherds	-	-	-	3	-
Shatter		8	-	4	-
Flakes		7	-	2	-
Biface	1	-	-	-	-
Notch/Flake	-	-	-	1	-
Ret./Ut. Chip	-	1	-	-	-

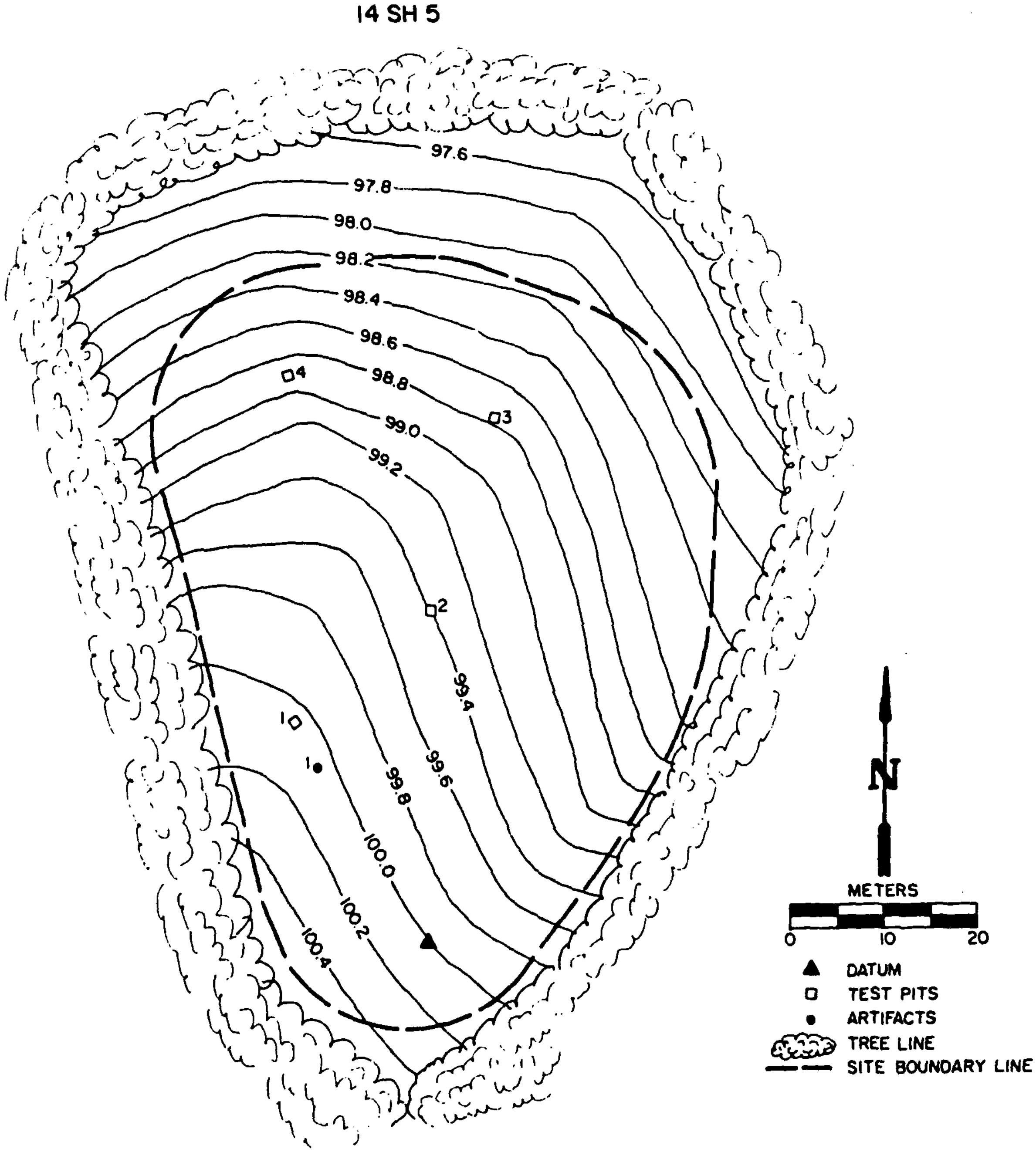


Figure 6.32. Map of 14SH5 showing location of surface find and test units.

Table 6.51. (cont').

Test Unit	xu3	xu3	xu4	xu4
Level	1	2	1	2
(cm)	0-15	15-25	0-15	15-28
Sherds	1	-	1	-
Shatter	4	2	19	4
Flakes	13	5	25	3
Proj. Pts.	1	-	1	-

Interpretations

The presence of small projectile points with side notching is indicative of the early Plains Village period. A resident of the area related to the Principal Investigator that deep plowing about 20 years ago brought up burned limestone and charcoal, but subsequent cultivation and erosion has removed any traces of such. The small artifact sample does not permit more than speculation as to the type of site, but its upland position is highly suggestive of a hunting and look-out camp.

Recommendations

The bluff top setting of this site and its Plains Village affiliation permit the hypothesis that this may have been an example of the upland summer encampment suggested to have been a part of the Pomona variant settlement pattern (Brown 1985). Unfortunately, the cultural deposits of the site do not present an adequate data base to test this hypothesis. Although the initial survey of this site resulted in recovery of a relatively large sample of cultural material, two subsequent investigations have failed to substantiate any significant research potential. Given the geomorphic setting, as described above, the scarcity of artifacts noted during the most recent investigations, and the confinement of this material to the plow zone, this site cannot be considered worthy of consideration for the National Register.

14SH6

Name: Unnamed
Recorded: KU, 1965
Cultural Affiliation: Unknown
Topographic Setting: Upland
Elevation: 277 m msl
Parent Material: Limestone & Shale
Slope: 1-2%
Drainage: Wakarusa River

Previous Research

This site was suggested to be associated with 14SH5 when

it was first surveyed (Chism 1966:31-32). Only lithic material of an undiagnostic nature was found at that time. The site was surveyed and "scratch tests" dug by Iroquois Research Institute in 1976. At that time the site was treated as one with 14SH5 and only 75 pieces of lithic debris were found throughout these site areas (Chambers et al. 1977:163).

Geomorphic Setting

Site 14SH6 is located on the same hillside as 14SH5, at an elevation of 277 m msl. The soil at 14SH5, like that at 14SH6, is an eroded Labette silty clay loam. A description of a representative soil profile at 14SH6 is presented in Table 6.52. As noted in the site description for 14SH5, the potential for deeply buried cultural materials in Labette soils is very low.

Table 6.52. Description of Soil Profile in Unit 1 at 14SH6.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark grayish brown (10YR3/2) silty clay loam; few fine and medium distinct dark brown (10YR3/3) mottles; moderate medium granular structure; friable; noneffervescent; abrupt smooth boundary.
15-20+	Bt	Dark yellowish brown (10YR4/4) silty clay; common fine distinct brown (7.5YR4/6) mottles; strong fine and medium subangular blocky structure; very firm; thin discontinuous clay films on ped surfaces; noneffervescent.

1986 Investigations

As noted above, 14SH6 is on the same hillside as 14SH5, to the east and across a wooded drainage gully. Again, Russian thistle and ragweed indicated previous disturbance, but ground cover was thicker, limiting visibility to 0% to 10%. The surface survey and shovel tests on August 28 resulted in the discovery of only two pieces of debitage at the eastern edge of the described site area, so four test units were placed there (Fig. 6.33). Very little cultural material was recovered from excavation, while the soils showed the same pattern as at 14SH5.

Assemblage

One biface fragment and 25 pieces of debitage is the extent of the artifact assemblage from 14SH6 (Table 6.53).

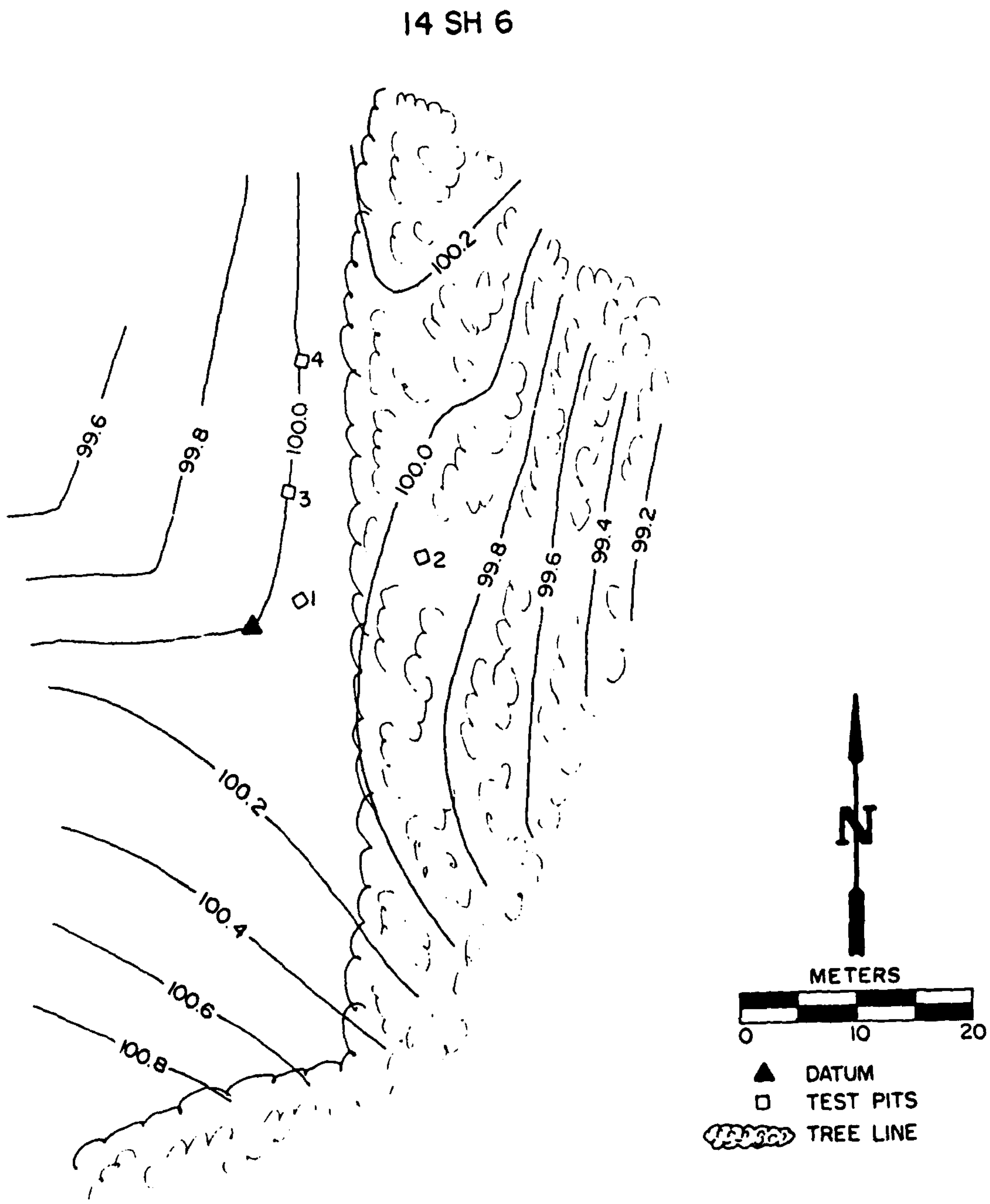


Figure 6.33. Map of 14SH6 showing location of test units. The boundaries of this site could not be determined because of the scarcity of cultural material.

Table 6.53. Cultural Material Recovered from 14SH6.

Test Unit Level (cm)	xu1 1 0-20	xu2 1 0-10	xu2 2 10-20	xu2 3 20-30	xu3 1 0-20	xu4 1 0-20
Shatter	2	-	-	-	4	1
Flakes	-	2	2	1	6	7
Biface Frag.	-	-	-	-	-	1

Interpretations

Due to the limited assemblage, and the likelihood of extensive disturbance and erosion, interpretations are not possible for this site, other than the possibility of a hunting camp based on its topographic position.

Recommendations

This site consists of a very small amount of undiagnostic lithic debris. It is not considered potentially significant and has little research potential. It does not warrant consideration for the National Register.

14SH101

Name: Richland **Recorded:** IRI, 1979
Cultural Affiliation: Archaic (?), Plains Woodland (Deer Creek phase), Plains Village (?)
Topographic Setting: T-2 terrace **Elevation:** 271-277 m msl
Parent Material: Alluvium **Slope:** 1%
Drainage: Wakarusa River

Previous Investigations

Surface collection and shovel tests were conducted by Iroquois Research Institute during the original survey of this site (Nathan 1980:156-160, 173). A preliminary survey resulted in the recognition of three areas of artifact concentration, each on a distinct lobe of the terrace. The controlled surface collection occurred on the eastern-most lobe and approximately 29,500 m^2 of surface area were subjected to a controlled collection. A total of 251 artifacts suggested to be of Archaic, Plains Woodland, and Plains Village periods was recovered. However, the large stemmed biface illustrated by Nathan (1980:Plate 30c) and suggested to be diagnostic of the Archaic period is actually a generalized tool type that is known to occur at site of the Plains Woodland period as well. It should not be considered indicative of an Archaic occupation, although such an affiliation could be hypothesized and tested in the future. The heaviest concentration of cultural material was noted on the eastern-most lobe and smaller amounts of material

were found on the two western lobes. The site was recommended for testing.

Geomorphic Setting

Site 14SH101 is located on the T-2 terrace in the Wakarusa River valley at an elevation of 271 to 277 m msl. Area B and the western half of Area A are on the broad, flat surface of the T-2 terrace (Fig. 6.34). The eastern half of Area A is on the steeply sloping scarp that separates the T-2 fill from the adjacent T-0b fill. The scarp descends approximately four meters to the T-0b surface. Areas A and B are separated by a channel scar that bisects the T-2 surface from north to south.

The soils on the T-2 surface at 14SH101 are mapped as Lady-smith silty clay loam in the Shawnee County soil survey (Abmeyer and Campbell 1970). According to Abmeyer and Campbell (1970:15), Ladysmith soils are formed in "fine-textured sediment, probably loess or old alluvial deposits". Three backhoe trenches (Trenches 1, 2 and 4; Fig. 6.34) were excavated on the T-2 surface in order to examine the soils and stratigraphy.

A detailed description of the soil profile exposed in Trench 1 is presented in Table 6.54. Also, Figure 6.35 shows the sedimentary units exposed on the north wall of Trench 1. Arabic numbers (1-3) are used to identify these units beginning with the uppermost deposit, Unit 1. Unconformities mark the contacts of the sedimentary units. The modern soil is formed in Unit 1. The thick A horizon is black and dark grayish brown silty clay loam. The A horizon graudally gives way to strongly developed silty clay Bt horizon. The argillic horizon is characterized by fine and medium subangular blocky structure and distinct mottling. Although the soil matrix of the Bt2 horizon is not calcareous, there are concretions of calcium carbonate scattered throughout this zone. The C horizon of the surface soil occurs in Unit 2. The upper contact of Unit 2 is marked by a sharp color and textural change. Unit 2 is a backwater deposit composed of dark grayish brown (2.5Y 4/2) clay. A thin, discontinuous lense of organic rich silty clay occurs within Unit 2 (Fig. 6.35). Examination of a sediment sample taken from the lenticular deposit revealed the presence of very fine charcoal particles and carbonized plant remains. These findings encouraged pollen and radiocarbon analyses. The results of the former are presented in chapter 9. Bulk organic carbon extracted from the silty clay yielded a radiocarbon date of 15,350±390 years B.P. This date indicates that the clayey alluvium in Unit 2 accumulated during late Wisconsinan time. Unit 2 rests unconformably on the eroded surface of Unit 3. The argillic horizon (3Btb) of a paleosol is developed at the top of Unit 3; the A horizon was removed by erosion prior to the deposition of Unit 2 alluvium. The 3Btb horizon is a dark yellowish brown silty clay with strong medium and coarse subangular blocky structure. The age of the paleosol and underlying fill is not known, but they could be considerably older than late Wisconsinan.

14SH101

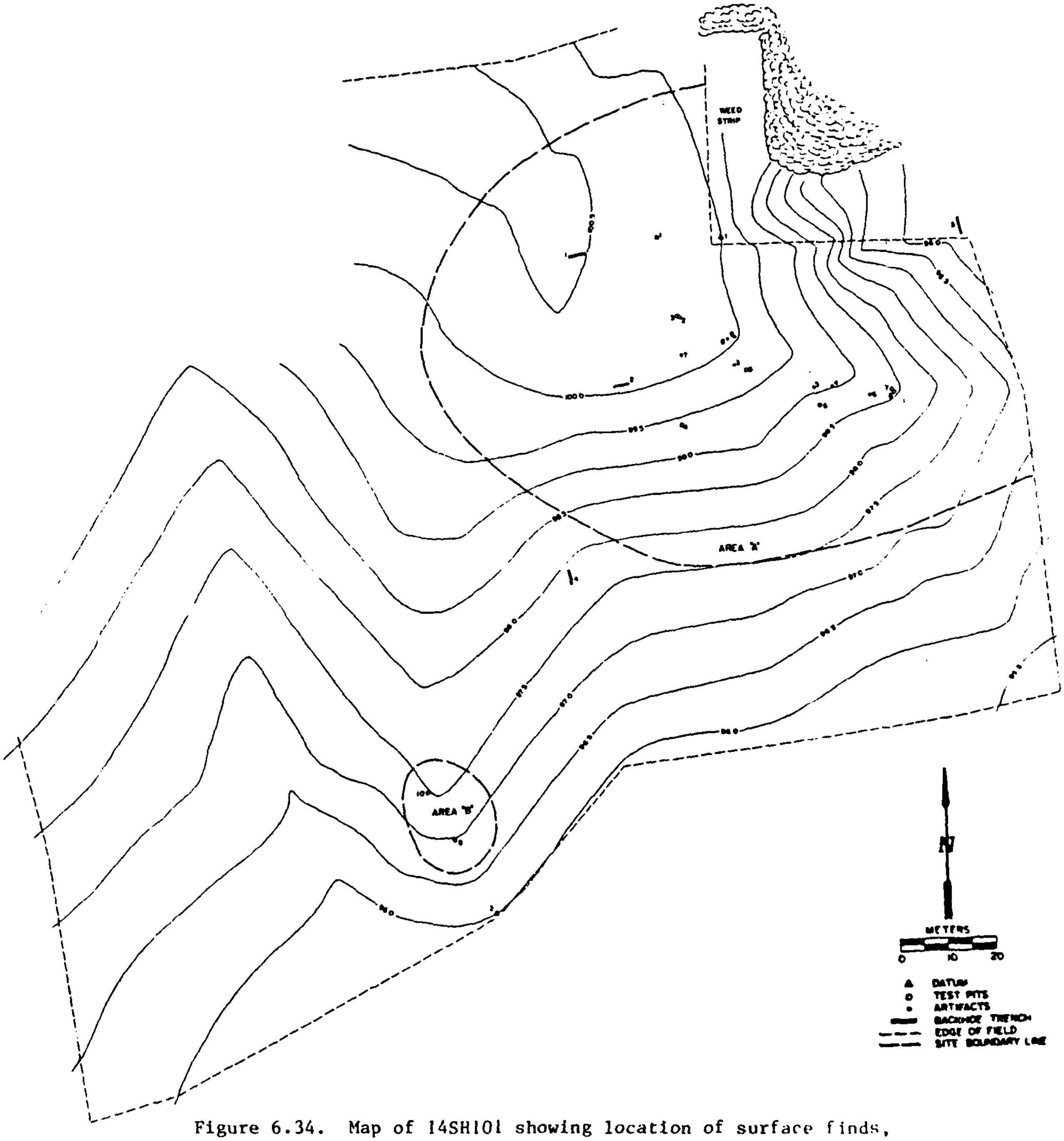


Figure 6.34. Map of 14SH101 showing location of surface finds, test units, and backhoe trenches. Boundaries of Area C west of Area B, could not be determined.

Table 6.54. Description of Soil Profile in Trench 1 at 14SH101.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark brown (10YR2/2) silty clay loam, very dark grayis brown (10YR3/2) dry; moderate fine granular structure; hard when dry; friable when moist; noneffervescent; abrupt smooth boundary.
15-30	A	Black (10YR2/1) silty clay loam, very dark gray (10YR3/1) dry; moderate medium granular structure; firm; noneffervescent; gradual smooth boundary.
30-43	BA	Black (10YR2/1) heavy silty clay loam, very dark grey (10YR3/1) dry; moderate fine subangular blocky structure; firm; common shiny surfaces on ped faces; noneffervescent; gradual, smooth boundary.
43-66	Bt1	Very dark grayish brown (10YR3/2) silty clay; common fine and medium distinct dark brown (10YR3/3), olive brown (2.5Y4/4), and very dark grayish brown (2.5Y3/2) mottles; moderate medium subangular blocky structure; thin continuous clay films on ped surfaces; noneffervescent; gradual smooth boundary.
66-104	Bt2	Mottled strong brown (7.5YR4/6), dark reddish brown (5YR2.5/2), yellowish red (5YR4/6), and grayish brown (2.5Y5/2) silty clay; moderate medium subangular blocky structure; very firm; thin discontinuous clay films on ped faces; few soft concretions of calcium carbonate; soil matrix is noneffervescent; abrupt smooth boundary.
104-147	2Cg	Dark grayish brown (2.5Y4/2) clay, few very fine strong brown (7.5YR4/6) and dark reddish brown (5YR3/4) mottles; massive; very firm; thin discontinuous lense of organic-rich silty clay in a zone 135-145cm below the land surface; noneffervescent; abrupt smooth boundary.
147-241	3Btb	Dark yellowish brown (10YR4/4) silty clay; few fine distinct yellowish red (5YR4/6) and strong brown (7.5YR5/6) mottles; strong medium and coarse subangular blocky structure; very firm; thick continuous clay films on ped faces; common fine ferromanganese concretions; noneffervescent.

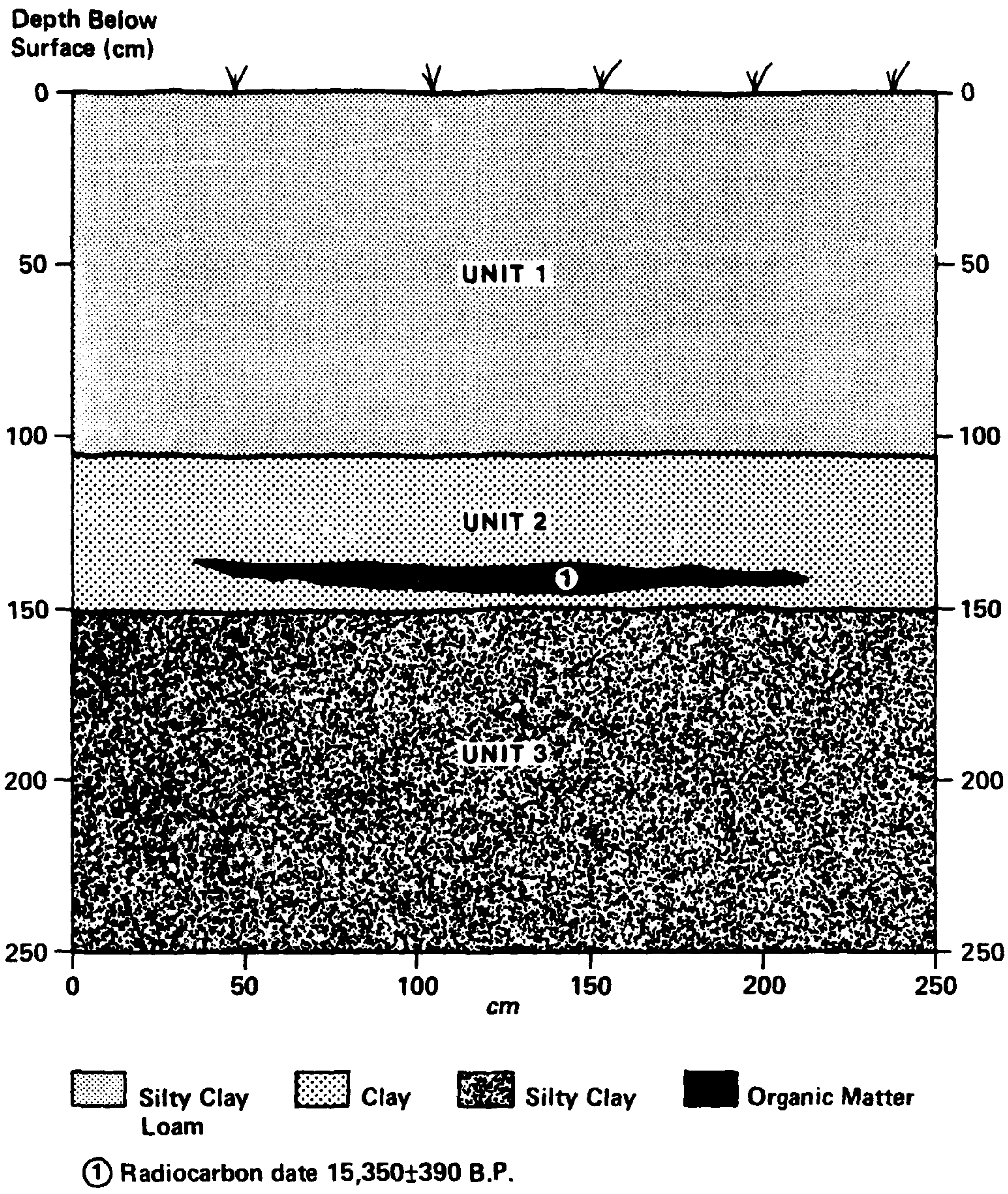


Figure 6.35. North wall profile of Trench 1 at 14SH101.

The soil-sedimentary sequence exposed in Trench 2 was basically the same as the sequence in Trench 1. However, there were no organic-rich zones within Unit 2 in Trench 2.

A single backhoe trench (Trench 4) was excavated in the channel scar on the T-2 terrace. Table 6.55 provides a detailed description of the soil profile exposed in Trench 4. A thick, black, silty clay loam A horizon overlies a very dark grayish brown silty clay loam Bt horizon. The argillic horizon gradually gives way to a calcareous, loamy Bk horizon. Many hard concretions of calcium carbonate occur throughout the Bk2 horizon. The Bk horizon overlies a noncalcareous, sandy C horizon. This soil-sedimentary profile is considerably different from the ones observed in Trenches 1 and 2. Instead of three sedimentary units, there is only one unit in the upper 2.5 m of the channel fill. This unit is characterized by an upward-fining sequence of sands, silts, and clays. Most of the unit is oxidized and well drained. Although the absolute age of channel fill is not known, the morphology of the surface soil suggests that the underlying fill is at least late Wisconsinan.

Table 6.55. Description of Soil Profile in Trench 4 at 14SH101.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Black (10YR2/1) silty clay loam, very dark gray (10YR3/1) dry; moderate fine granular structure; friable; noneffervescent; abrupt smooth boundary.
15-26	A	Black (10YR2/1) silty clay loam, very dark gray (10YR3/1) dry; moderate medium granular structure; friable; noneffervescent; gradual smooth boundary.
26-38	BA	Very dark brown (10YR2/2) silty clay loam, very dark grayish brown (10YR3/2) dry; moderate fine subangular blocky structure; firm; common shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
38-76	Bt	Very dark grayish brown (10YR3/2) silty clay loam, dark brown (10YR3/3) dry; common fine and medium distinct dark yellowish brown (10YR4/4) mottles; moderate medium subangular blocky structure; firm; common black (10YR2/1) and very dark brown (10YR3/3) coatings on ped faces; common thick continuous clay films; noneffervescent; diffuse boundary.

Table 6.55. (cont')

76-137	Bk1	Dark yellowish brown (10YR4/6) silt loam, yellowish brown (10YR5/8) dry; weak fine and medium subangular blocky structure; firm; common hard concretions of calcium carbonate 1-2cm in diameter; few threads of calcium carbonate; strongly effervescent; gradual smooth boundary.
137-172	Bk2	Dark yellowish brown (10YR4/6) loam, yellowish brown (10YR5/8) dry; weak fine subangular blocky structure; firm; few hard concretions of calcium carbonate 1-2cm in diameter; mild effervescence; gradual smooth boundary.
172-185	BC	Dark yellowish brown (10YR4/6) very fine sandy loam, yellowish brown (10YR5/8) dry; weak very fine subangular blocky structure; firm; noneffervescent; gradual smooth boundary.
185-254+	C	Dark yellowish brown (10YR4/6) loamy fine sand; yellowish brown (10YR5/8) dry; massive; firm; noneffervescent.

A backhoe trench (Trench 3) was also excavated on the T-0b surface in order to assess the soil stratigraphy and to determine the potential for buried cultural materials. Table 6.56 provides a detailed description of the soil profile exposed in Trench 3. The soil on the T-0b surface at 14SH101 is the Kennebec silt loam. This soil is characterized by a thick, very dark grayish brown silty clay loam C horizon. The surface of a buried A horizon was observed at a depth of 1.42 m. Soil from the upper 15 cm of this paleosol was radiocarbon dated at 1240$\pm$90 years B.P. The 2Ab horizon gives way to a gravelly loam C horizon. Bedrock occurs at a depth of 2.03 m below the T-0b surface. Thus, most of the T-0b fill at 14SH101 is less than about 1200 years old.

Table 6.56. Description of Soil Profile in Trench 3 at 14SH101.

Depth (cm)	Soil Horizon	Description
0-20	Ap	Very dark grayish brown (10YR3/2) silt loam, dark grayish brown (10YR4/2) dry; weak fine granular structure; friable; noneffervescent; abrupt smooth boundary.

Table 6.56. (cont')

20-31	A	Color like above, light silty clay loam; fine and medium granular structure; friable; common worm casts; noneffervescent; gradual smooth boundary.
31-45	AC	Dark brown (10YR3/3) silty clay loam, brown (10YR4/3) dry; weak fine subangular blocky structure; friable; noneffervescent; gradual smooth boundary.
45-142	C	Dark brown (10YR3/3) heavy silty clay loam, brown (10YR4/3) dry; common fine and medium distinct dark yellowish brown (10YR4/4) mottles; massive; firm; noneffervescent; abrupt smooth boundary.
142-162	2Ab	Very dark gray (10YR3/1) silt loam, very dark grayish brown (10YR3/2) dry; weak fine granular structure; friable; noneffervescent; gradual smooth boundary.
162-187	2ACb	Dark brown (10YR3/3) loam, brown (10YR4/3) dry; weak very fine granular structure; noneffervescent; gradual smooth boundary.
187-203	3C	Color like above; gravelly loam; massive; friable; 40 percent by volume, angular rock fragments; noneffervescent; clear smooth boundary.
203+	R	Shale.

In summary, clayey alluvium 1.04 to 1.47 cm below the T-2 surface at 14SH101 was deposited approximately 15,350 years ago. Based on this date, Paleoindian cultural materials may be deeply buried beneath the T-2 surface at 14SH101. Soils evidence at 14SH101 suggests that the T-2 terrace has been relatively stable since late Wisconsinan time and may therefore have surface sites of Paleoindian and later periods. Most of the sediment of the T-ob terrace at 14SH101 was deposited during the very late Holocene. The potential for deeply buried sites dating to Plains Woodland or later cultural materials is high for the T-0b fill due to the presence of a 1250 year old paleosol at a depth of 1.42 m below the floodplain surface.

1986 Investigations

On September 3 the entire site area designated by IRI was

surveyed. The site was in medium-tall milo at that time and visibility was fair to good (50-75%). The three lobes of the terrace were designated, from east to west, Areas A, B and C. Although all three terrace lobes were walked, cultural material was only seen in Areas A and B (Fig. 6.34). Artifacts recovered from the surface of the site are described in Table 6.57. When the site was visited during the preliminary phase of the project (i.e., for the research design), a small unnotched arrow point (Fig. 6.36f) was found in Area C. Given the lack of cultural material in that area and the relative abundance of artifacts in Area A, it was decided to focus attention on the latter. A datum was established off the cultivated field and eight test units placed in areas of artifact concentration. In particular, Units 2 and 3 were placed in an concentration of burned limestone and Units 7 and 8 were placed near the edge of the terrace, where artifacts were particulary plentiful. Area B contained only a small scatter of lithic debris and two test units were considered sufficient to explore its research potential. They were placed in the area where a few scattered pieces of debitage occurred and were mapped with respect to a secondary datum established on the southern edge of the site, off the cultivated land (Fig. 6.34).

Table 6.57. Surface Artifacts from 14SH101 shown on Figure 6.34.

Artifact 1	1 Hammerstone*
Artifact 2	1 Unnotched Projectile Point (Fig. 6.36f)*
Artifact 3	1 Mano
Artifact 4	1 *Scallorn* Arrow Point (Fig. 6.36j)
Artifact 5	1 Projectile Point Tip
Artifact 6	1 Body Sherd
Artifact 7	1 Body Sherd (Fig. 6.36a)
Artifact 8	1 Biface (Hoe?) (Fig. 6.37e)
Artifact 9	1 Body Sherd

* These artifacts were collected prior to establishment of a datum and were not mapped.

Excavation of test units occurred from September 4-6. Material recovered from these units is itemized in Table 6.58. Units 9 and 10, in Area B, proved to be very poor in cultural material. Moreover, erosion had been so extensive in that area that the Bt horizon was encountered less than 10 cm below surface. In Area A, units near the edge of the terrace encountered the same phenomenon. Artifact frequency in Units 7 and 8, for example, dropped off significantly in the levels below plow zone. However, in Units 2 and 3, located away from the terrace edge, the levels below plow zone contained a relatively intact feature consisting of a concentration of burned limestone and associated bone, lithics, and charcoal. This was designated Feature 1 (Figs. 6.38-6.40).

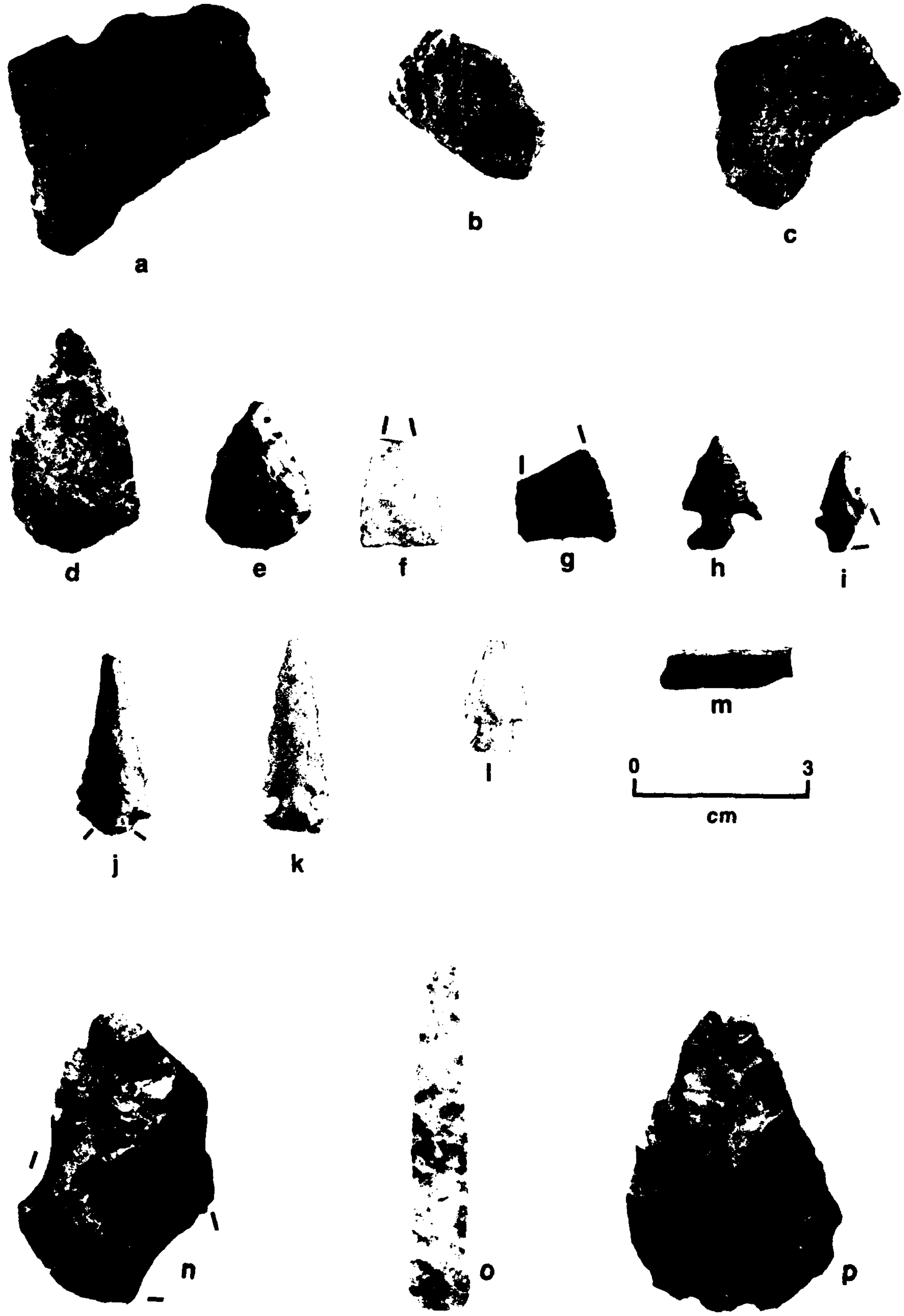


Figure 6.36. Selected artifacts from 14SH101. a–c) Plains Woodland ceramic ware body sherds, l–r, SH101860007, SH101860654, SH101860073 d–g) unnotched projectile points, l–r, SH101860319, SH101860318, SH101860002, SH101860010 h) corner-notched arrow point, SH101860480 i) biface fragment (arrow point?) SH101860320 j–l) Scallorn arrow points, l–r, SH101860004, SH101861063, SH101862695 (this last is from Feature 1) m) worked bone fragment, SH101862411 n) burned biface from Feature 1, SH101864957 o) drill, SH101860756 p) biface, SH101860011

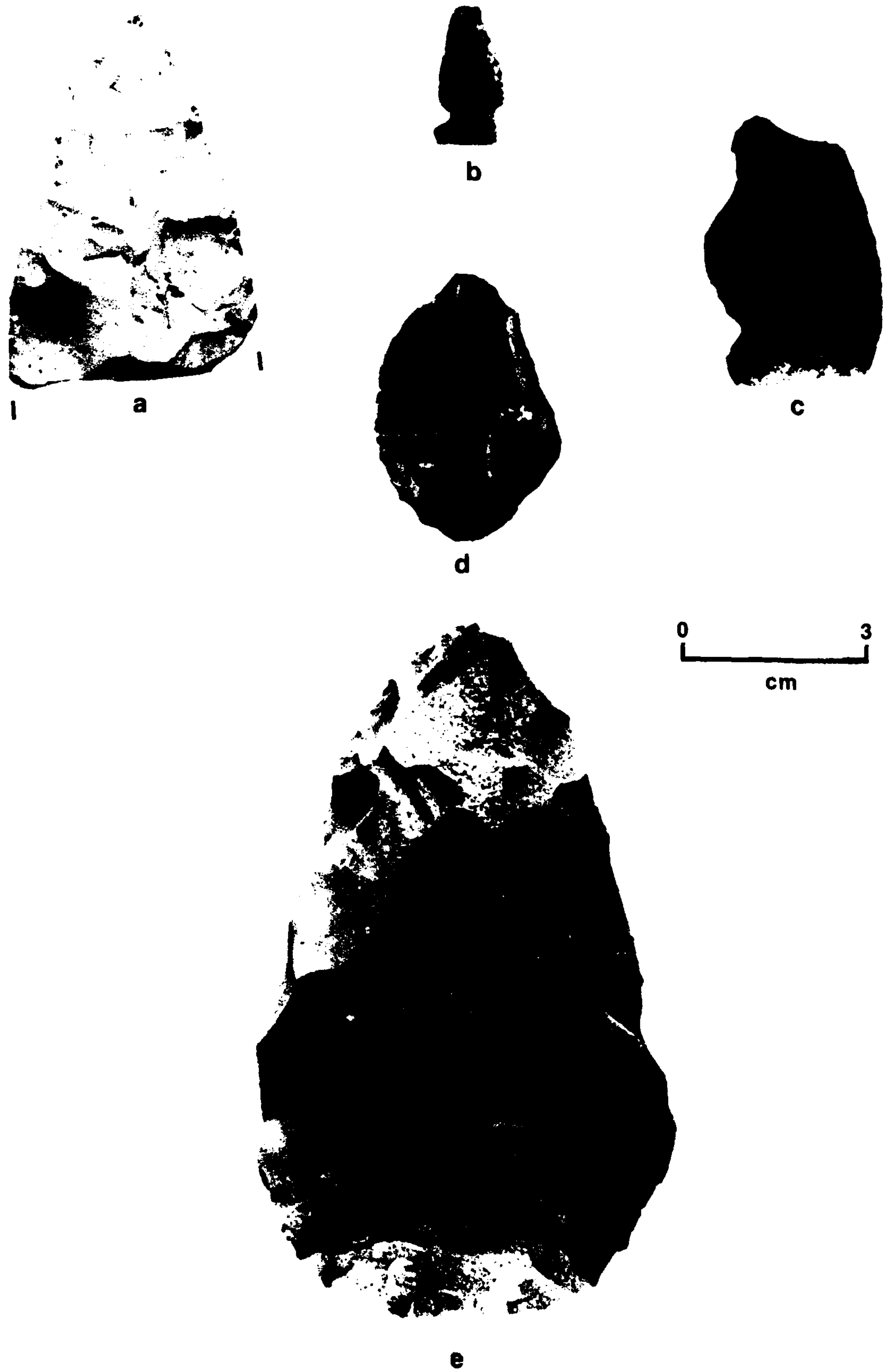


Figure 6.37. Selected artifacts from 14SH101 and 14SH103. a) biface fragment, SH103860001 b) side-notched arrow point, SH103860055 c) retouched flake, SH103860057 d) end scraper, SH103860056 e) bifacial hoe, SH101860008.

Table 6.58. Cultural Material Recovered from 14SH101.

Test Unit Level (cm)	Sur- face	xu1 1 0-20	xu1 2 20-30	xu2 1 0-20	xu2 2 20-30
Sherds	3	-	-	4	2
Shatter		2	-	12	7
Flakes		6	-	39	15
Proj. Pts.	2	1	-	1	-
Biface	1	1	-	-	-
Biface Frag.	1	-	-	-	-
Ret./Ut. Flake	-	1	-	-	-
Hammerstone	1	-	-	-	-
Mano	1	-	-	-	-

Table 6.58. (cont').

Test Unit Level (cm)	xu3 1 0-20	xu3 2 20-30	xu3 3 30-35	Fea.1 1 20-30	Fea.1 2 30-37
Sherds	1	-	-	-	-
Shatter	20	5	1	21	6
Flakes	37	6	2	39	19
Cores	-	-	1	-	1
Proj. Pts.	-	-	-	1	-
Biface Frag.	-	-	-	-	1
Notch/Flake	-	-	-	1	-
Ret./Ut. Flake	-	-	-	-	1
Ret./Ut. Blade	1	-	-	-	-
Ret./Ut. Shatter	-	-	-	-	1
Fauna	-	1	-	6	2

Table 6.58. (cont').

Test Unit Level (cm)	xu4 1 0-20	xu4 2 20-30	xu5 1 0-10	xu5 2 10-20	xu5 3 20-30	xu6 1 0-10	xu6 2 10-20
Sherds	1	-	12	7	-	6	1
Shatter	9	1	25	25	-	25	9
Flakes	41	3	65	68	3	76	9
Potlids	-	-	1	1	-	1	-
Cores	-	-	-	-	-	-	1
Knife Frag.	1	-	-	-	-	-	-
Biface	-	-	-	-	-	1	-
Biface Frag.	1	-	-	2	-	1	-
Notch/Flake	-	-	1	-	-	-	-
Notch/Shatter	-	-	-	-	-	-	1
Ret./Ut. Flake	1	-	-	1	-	1	-
Ret./Ut. Chip	-	-	1	-	-	-	-
Ret./Ut. Shatter	-	-	-	-	-	2	-

Table 6.58. (cont').

Test Unit Level (cm)	xu7 1 0-10	xu7 2 10-20	xu7 3 20-30	xu8 1 0-10	xu8 2 10-20	xu9 1 0-10	xu10 1 10-15
Sherds	4	-	-	4	-	-	-
Shatter	37	16	1	25	3	2	-
Flakes	119	69	8	164	29	10	3
Cores	1	-	-	-	-	-	-
Proj. Pts.	1	-	-	-	-	-	-
Drill	-	-	-	1	-	-	-
Ret./Ut. Flake	-	1	-	1	1	-	-
Ret./Ut. Blade	1	-	-	-	-	-	-
Ret./Ut. Core	1	-	-	-	-	-	-
Hammerstone	-	1	-	-	-	-	-

Although Feature 1 had suffered some damage due to plowing, a comparison of the counts and weights of burned limestone in the plow zone (0-20 cm below surface) to those in the lower levels demonstrates its relatively undisturbed nature (Table 6.59). The extent of damage done to cultural deposits in other areas of the site is reflected by the distribution of burned limestone in Units 5, 6 and 8 (Table 6.60). Note that none of these units contained any such material below the plow zone and that other cultural material (Table 6.58) experienced a decline in frequency in the lower levels. Feature 1 was encountered as a definable concentration of limestone at a depth of ca. 20 cm

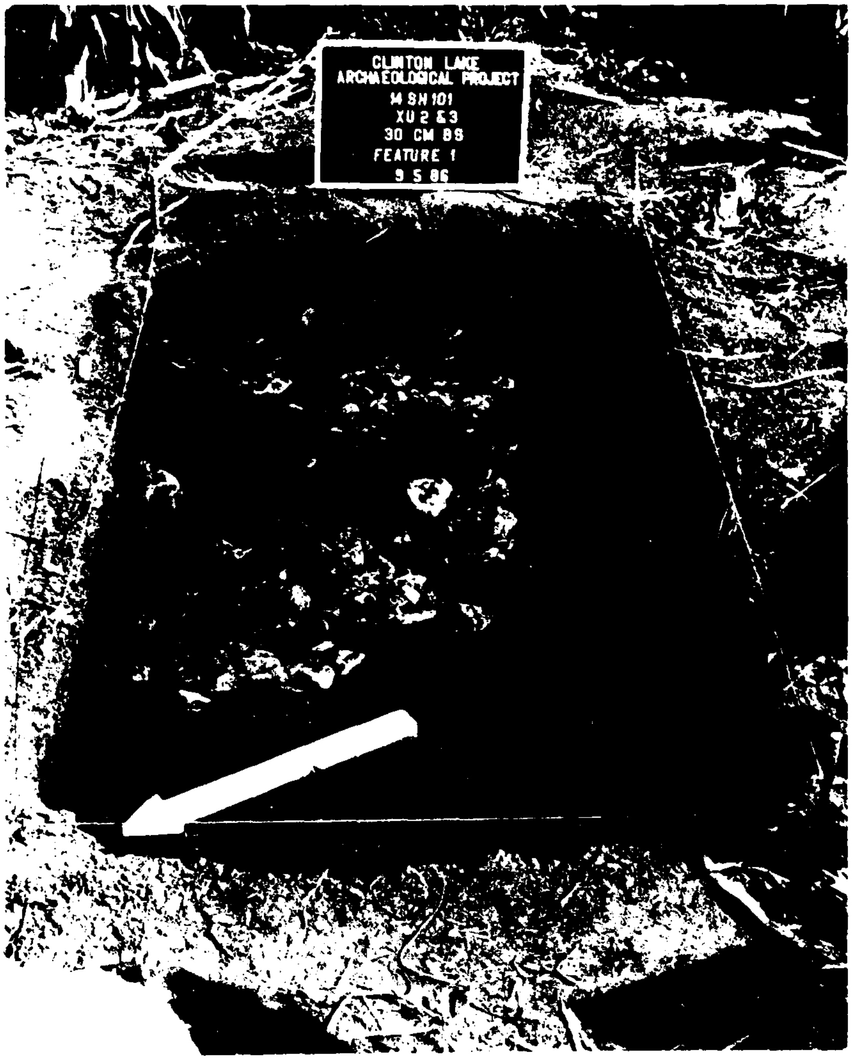


Figure 6.38 Photograph of Feature 1 at 14SH101

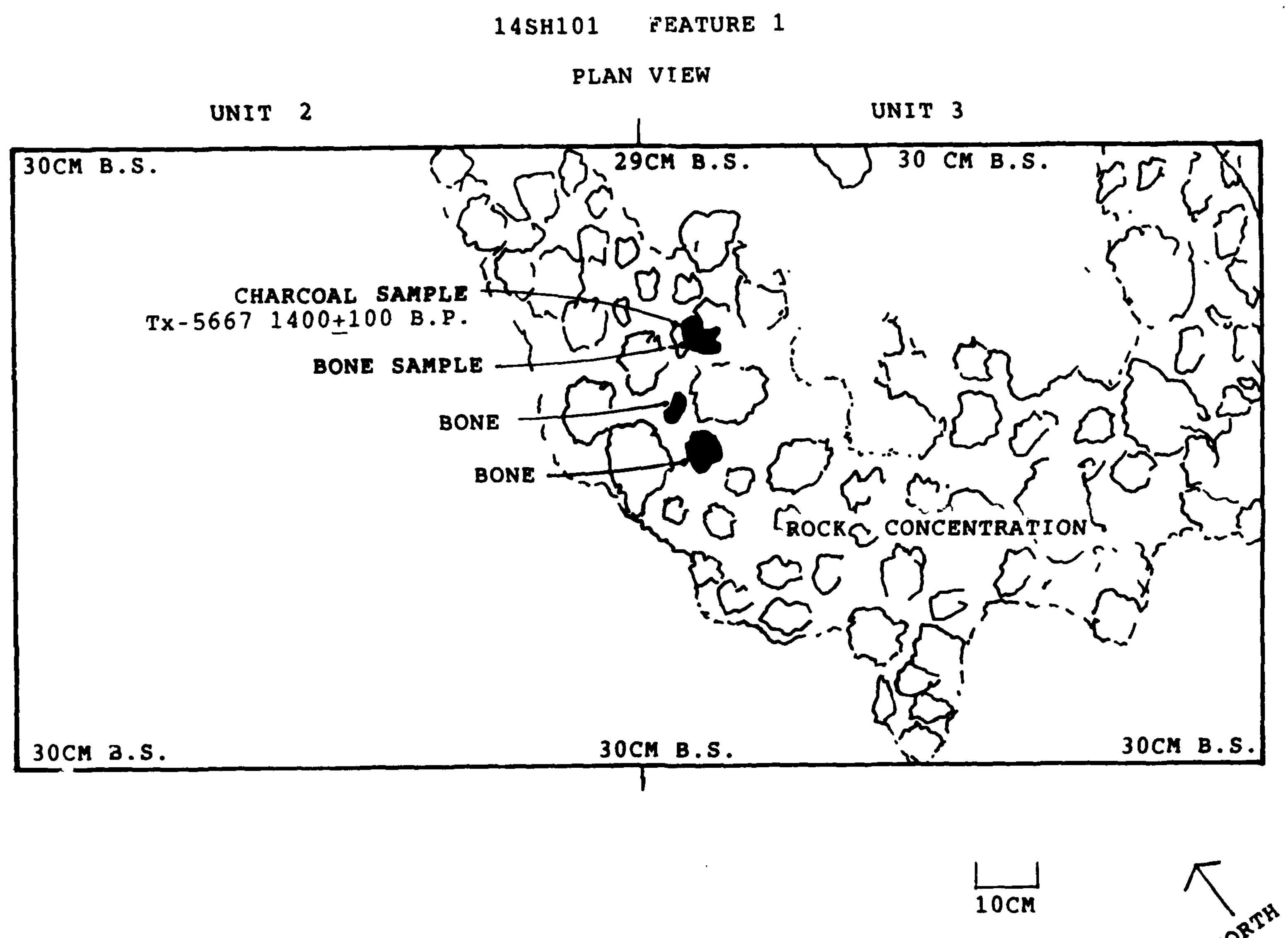


Figure 6.39. Plan view of Feature 1 at 14SH101.

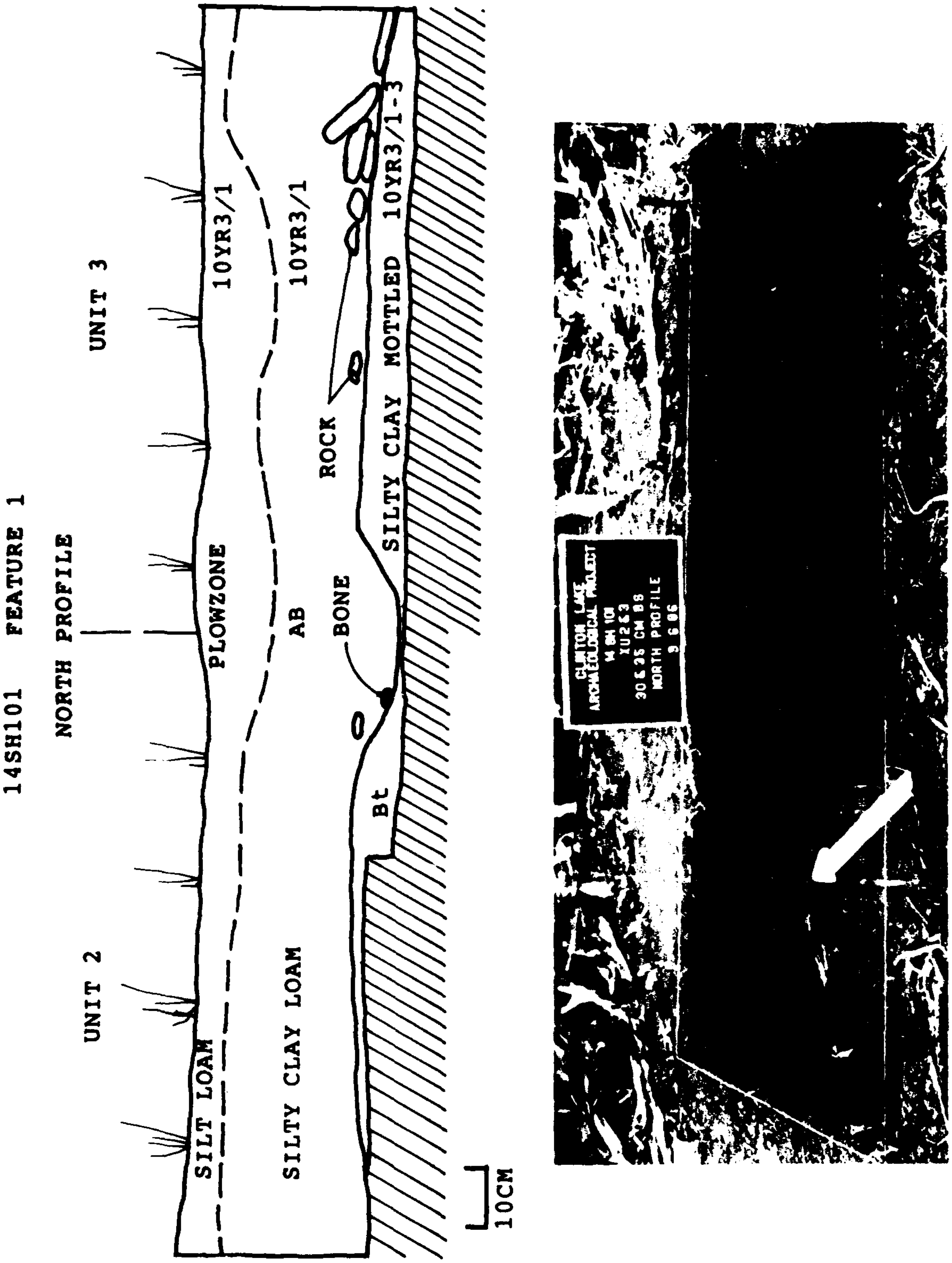


Figure 6.40. Profile and photograph of Units 2 and 3 at 14SH101.

and it extended to a depth of 30-35 cm below surface. The structure of the feature, so far as it was excavated, appears in the form of an arc (Fig. 6.39). The surrounding matrix was not cuturally sterile, although the number of artifacts recovered in the areas around the feature was relatively low. The feature was not completely excavated and appears to extend to the northeast of Units 2 and 3, as revealed in a profile of the north wall (Fig. 6.40).

Table 6.59. Burned Limestone from 14SH101: Unit 2, 3 & Feature 1

Unit No.	Level (cm)	Quantity	Weight (gms.)
2	1 (0-20)	64	657.0
2	2 (20-30)	77	328.5
3	1 (0-20)	416	2004.5
3	2 (20-30)	576	2861.0
Feature 1	1 (20-30)	739	16,864.5
Feature 1	1 (20-30)	uncounted*	746.5
Feature 1	2 (30-37)	115	3858.5
Feature 1	2 (30-37)	uncounted*	196.5
Totals		1987	26,574.0
		uncounted*	943.0

*flotation sample, sorted but not counted.

Table 6.60. Burned Limestone from 14SH101: Units 5, 6 and 8.

Unit No.	Level (cm)	Quantity	Weight (gms.)
5	1 (0-10)	10	84.0
6	1 (0-10)	5	62.0
8	1 (0-10)	35	269.5
Totals		50	415.5

One diagnostic artifact was found in association with the feature. This is a small Scallorn arrow point (Fig. 6.36l), indicative of the Plains Woodland period. A complete Scallorn arrow point (Fig. 6.36k) was also recovered from the plow zone above the feature. On the basis of this material, it was hypothesized that the feature could be assigned to the Deer Creek phase. Charcoal samples recovered from the feature were submitted for radiocarbon dating. Two dates were obtained from one laboratory. These are 1130±60 B.P.: A.D. 820 (Beta-18609) and 1460±100 B.P.: A.D. 490 (Beta-18610). A third sample was

submitted to a different laboratory in order to corroborate one or the other of these dates. The date obtained is 1400±100 B.P.: A.D. 550 (Tx-5667), which falls within the same range as the older date from Beta Analytic. In order to refine the date of the feature, both of these dates were averaged. The assumption underlying the averaging of these dates is that one event is represented by the feature (cf. Long and Rippeteau 1974). The average obtained is 1430.0±70.7 B.P. This date was then calibrated, using a recent calibration curve (Stuiver and Becker 1986), to 1311 B.P. or A.D. 639 (Appendix 2).

Assemblage

The artifact assemblage from 14SH101 is both abundant and varied. It consists of 17 formal chipped stone tools, 18 informal chipped stone tools, 1,099 pieces of debitage, two hammerstones, one mano, 45 pieces of pottery, and an abundance of burned limestone and burned human bone from Feature 1 (Table 6.58; see chapter 9, section on human remains for a detailed quantification and description of that material).

Interpretation

The ceramic assemblage is characteristic of the Plains Woodland period (Fig. 6.36a-c; see chapter 8), as are the Scallorn projectile points (Fig. 6.36j-l). A few triangular, unnotched arrow points or point preforms (Fig. 6.36d-g) may indicate a later Plains Village occupation. However, the association of these two point styles may well have occurred at some time during the transition from the Plains Woodland to the Plains Village periods. Thus, this site may actually be assignable to a single time period. Further work is needed to confirm this hypothesis.

The abundance and variety of artifacts found at this site suggest it was occupied for some time or, at least, reoccupied on a number of occasions. Projectile points indicate the importance of hunting to the site occupants. A mano suggests plant food processing occurred as well. A large biface (Fig. 6.37e) may have served as a hoe for obtaining plant foods. A drill (Fig. 6.36o) and scraping tools reflect an activity such as hide preparation. The relative abundance of ceramic artifacts at this site, as compared to most sites in the Clinton Lake area, also seems to indicate a more prolonged occupation of the site. Finally, the presence of an abundance of burned human bone in Feature 1, and the near absence of plant and animal remains from it (see chapter 9), is clear evidence of cremation, a mortuary practice common during the Woodland period in the eastern United States.

Recommendations

14SH101 contains an abundance and variety of prehistoric cultural material indicative of the Plains Woodland period and, perhaps, the Plains Village period. Lithic and ceramic

artifacts indicate a Deer Creek phase occupation. Radiocarbon dates from Feature 1, a crematorium with an associated diagnostic arrow point, provide the first absolute chronology for this phase in the Wakarusa River basin (ca. A.D. 640). Feature 1 was not entirely excavated and, although relatively intact, is nonetheless vulnerable to deep plowing and prolonged farming of the eroding terrace on which it occurs. The unique nature of Feature 1, the stratigraphic integrity of the site away from the terrace edge, and the quantity and quality of the cultural material represented in the recovered assemblage make 14SH101 a significant site. It is recommended that this site be considered eligible for the National Register. Guidelines and research goals for any future investigation of this important site are presented in chapter 10.

14SH102

Name: Unnamed
Recorded: IRI, 1979
Cultural Affiliation: Unknown
Topographic Setting: T-2 Terrace
Elevation: 277m msl
Parent Material: Alluvium
Slope: <1%
Drainage: Wakarusa River

Previous Investigations

A controlled surface collection and shovel tests were conducted at this site by Iroquois Research Institute (Nathan 1980:160-161). Only eight lithic artifacts were recovered, including a biface fragment, utilized flake, retouched flake, and five pieces of debitage. With this limited data, it was not possible to determine the cultural affiliation of the site.

Geomorphic Setting

Site 14SH102 is located on the broad flat surface of the T-2 terrace in the Wakarusa River Valley at an elevation of approximately 277m msl. The soil at 14SH102 is mapped as the Wabash silty clay in the Soil Survey of Shawnee County, Kansas (Abmeyer and Campbell 1970). The Wabash soil is formed in clay-rich backwater deposits on the T-1 surface. Although the soil at 14SH102 is clayey, its fine texture is primarily due to pedogenesis instead of the texture of the parent material. Also, the soil at 14SH102 is too strongly oxidized to be classified as the Wabash silty clay. Table 6.61 provides a detailed description of the soil profile exposed in Trench 1. The soil is characterized by a thick, very dark brown to black silty clay loam A horizon. The mollic epipedon gradually gives way to a dark yellowish brown silty clay Bt horizon. The argillic horizon of the surface soil overlies the Bt horizon of a paleosol. The boundary between the Bt and 2Btb horizon is at a depth of 1.42m below the T-2 surface. The buried Bt horizon is strongly oxidized silty clay loam with strong, coarse, subangular and angular structure.

Table 6.61. Description of Soil Profile in Trench 1 at 14SH102.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark brown (10YR2/2) light silty clay loam, very dark grayish brown (10YR3/2) dry; weak medium granular structure; friable; noneffervescent; abrupt smooth boundary.
15-38	A	Black (10YR2/1) light silty clay loam, very dark gray (10YR3/1) dry; firm; noneffervescent; gradual smooth boundary.
38-48	BA	Dark brown (10YR3/3) silty clay loam, moderate fine and medium subangular blocky structure; firm; very dark grayish brown (10YR3/2) coatings on faces of peds; common shiny surfaces on faces of peds; noneffervescent; gradual smooth boundary.
48-142	Bt	Dark yellowish brown (10YR4/4) light silty clay; common fine and medium distinct strong brown (7.5YR4/6 & 5/6) mottles; moderate medium subsubangular blocky structure; very firm; common dark grayish brown (10YR4/2) and brown (10YR4/3) coatings on ped faces; thin discontinuous clay films on ped faces; few very fine ferromanganese concretions; noneffervescent; clear smooth boundary.
142-190	2Btb	Yellowish red (5YR4/6) silty clay loam; common medium taint strong brown (7.5YR4/6) mottles; strong coarse subangular and angular blocky structure; very firm; common very dark gray (7.5YR N3/0) and brown (7.5YR4/2) coatings on ped faces; thick discontinuous clay films on ped faces; few fine ferromanganese concretions; noneffervescent.

Although the absolute age of the T-2 fill is not known at 14SH102, radiocarbon data from 14SH101 indicate that alluvium above the 2Btb horizon accumulated during late-Wisconsinan time. Thus, Paleoindian cultural materials may be deeply buried beneath the T-2 surface at 14SH102. Soil evidence indicates that the T-2 surface has been sufficiently stable since late Wisconsinan time and may therefore have evidence of Paleoindian and later cultural periods on its surface.

1986 Investigations

14SH102 was located from the site form description, and was supposed to be immediately adjacent to a gravel road. When the site was visited on August 29, this area was a recently mowed grass strip 15 meters wide, separating the road from a cornfield. Shovel tests in the grassed areas and transects down the corn rows did not yield any artifacts. Four test units were randomly placed along the purported site area (Fig. 6.41). All units were excavated in the following fashion: Level 1 (0-20 cm below surface) and Level 2 (20-30 cm below surface). Neither prehistoric nor historic artifacts were found.

Recommendations

Given the complete absence of cultural material at this site, it is not deemed worthy of National Register consideration.

14SH103

Name: Unnamed **Recorded:** IRI, 1979
Cultural Affiliation: Plains Woodland or Plains Village
Topographic Setting: T-2 terrace **Elevation:** 277 m msl
Parent Material: Alluvium **Slope:** <1%
Drainage: Wakarusa River

Previous Investigations

This site was first investigated by Iroquois Research Institute in 1979 (Nathan 1980:161-165). At that time controlled surface collections and shovel tests were conducted. The extent of the site was then estimated as 6,875 m^2. The recovered assemblage consisted of 145 artifacts including lithic and ceramic material. A large projectile point found at the site was compared to similar finds at the Coffey site in north-central Kansas and a possible Archaic occupation inferred. Ceramic artifacts were compared to Plains Woodland ware of the Grasshopper Falls phase. The site was identified as occurring on the Wakarusa River floodplain. As is explained below, the site is actually on the T-2 terrace.

Geomorphic Setting

Site 14SH103 is located on the broad flat surface of the T-2 terrace in the Wakarusa River Valley. The site is at an elevation of approximately 227m msl. The soil at 14Sh103 is mapped as the Reading silty clay loam in the Soil Survey of Shawnee County, Kansas (Abmeyer and Campbell 1970). However, like the soils at 14SH102 and 14SH101, the T-2 soil at 14SH103 has been misclassified in the soil-survey report. Table 6.62 provides a description of the soil profile in Trench 1. Although the A and BA horizons are similar to the surface horizons of the Reading soil, the subsoil resembles the oxidized Bt horizons observed at

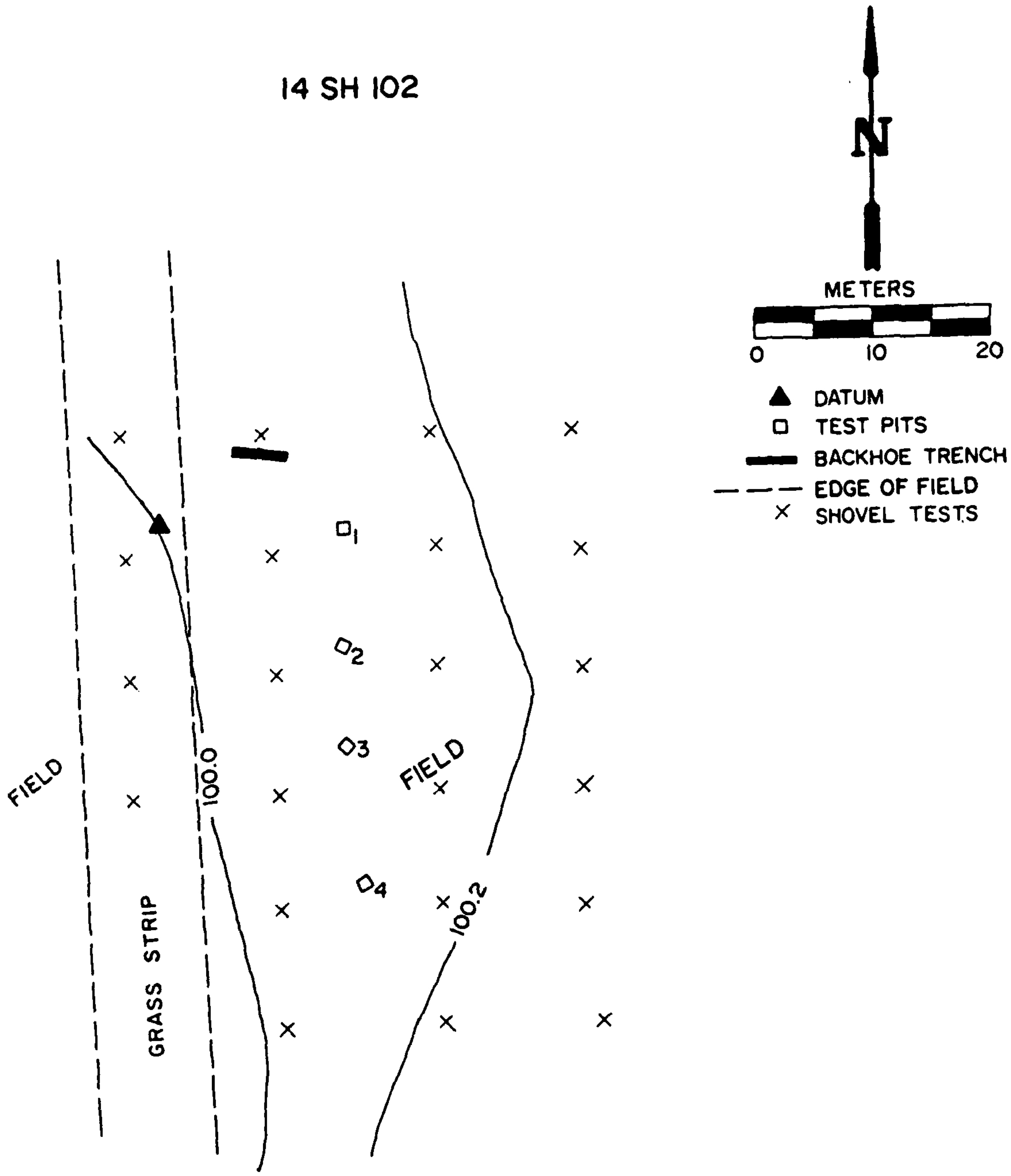


Figure 6.41. Map of 14SH102 showing location of test units and backhoe trench. The boundaries of this site could not be determined because of the absence of cultural material.

14SH102 and 14SH101. A thick mollic epipedon gradually gives way to a dark yellowish brown silty clay Bt horizon. The argillic horizon of the surface soil overlies the Bt horizon of a paleosol. The boundary between the Bt and 2Btb horizon is at a depth of 93 cmbelow the T-2 surface. The buried Bt horizon is strongly oxidized silty clay loam with strong coarse, subangular and angular blocky structure.

Table 6.62. Description of Soil Profile in Trench 1 at 14SH103.

Depth (cm)	Soil Horizon	Description
0-15	Ap	Very dark brown (10YR2/2) light silty clay loam, very dark grayish brown (10YR3/2) dry; weak medium granular structure; friable; noneffervescent; abrupt smooth boundary.
15-35	A	Black (10YR2/1) light silty clay loam. very dark gray (10YR3/1) dry; firm; noneffervescent; gradual smooth boundary.
35-48	BA	Dark brown (10YR3/3) silty clay loam; few fine distinct dark yellowish brown (10YR4/4) mottles; moderate fine and medium subangular blocky structure; firm; common very dark grayish brown (10YR3/2) coatings on ped faces; common shiny surfaces on ped faces; noneffervescent; gradual smooth boundary.
48-93	Bt	Dark yellowish brown (10YR4/4) light silty clay; common fine and medium distinct strong brown (7.5YR4/6 & 5/6) mottles; moderate medium subangular blocky structure; very firm; common dark grayish brown (10YR4/2) and brown (10YR4/3) coatings on ped faces; few fine ferromanganese concretions; clear smooth boundary.
93-139+	Btb	Yellowish red (5YR4/6) silty clay loam; common medium faint strong brown (7.5YR4/6) and reddish brown (5YR4/4) mottles; strong coarse subangular and angular blocky structure; very firm; common brown (7.5YR4/2) coatings on ped faces; thick discontinuous clay films on ped surfaces; few fine ferromanganese concretions; noneffervescent.

Based on radiocarbon data and soil geomorphic evidence at 14SH101, there is potential for deeply buried Paleoindian sites

at 14SH103. Evidence for Paleoindian and later cultural periods may occur on the T-2 surface.

1986 Investigations

14SH103 was surveyed and excavated on September 2 and 3. The pedestrian survey located a diffuse lithic scatter in a weed strip bordered on one side by a milo field and a meander scar on the other side. The surface scatter was determined to cover approximately 3600 square meters (Fig. 6.42). One biface fragment was plotted and collected (Fig. 6.42, Artifact 1; Fig. 6.37a [p. 181]), while two very small, thin, grit-tempered sherds were noted but not collected. Four test units were placed within areas of artifact concentrations, with Unit 2 in the milo field and the others in the weed strip.

Units 2, 3 and 4 were excavated in 10 cm levels, in case this area had not been cultivated. Small quantities of chipping debris were recovered from Level 1, and Level 2 displayed bottom of plow zone at around 15 cm below surface in the three units. Levels 1 and 2 of Unit 3 showed the same artifact density, but Units 1 and 4 showed artifacts to be restricted to the upper 10 cm. Unit 2 was taken 0 to 20 cm in the first level, as the unit was in a cultiuvated area. The unit was sterile below 20 cm. Flakes were noted to be vertically-oriented in lower levels of the units, suggesting vertical transport of artifacts through dessication cracks.

Assemblage

Cultural material recovered from 14SH103 was limited to 107 lithic artifacts and one body sherd (Table 6.63). The two formal lithic tools in the assemblage were taken from Unit 3, Level 1; a side-notched projectile point (Fig. 6.37b [p. 181]) and a small end scraper (Fig. 6.37d), in addition to a retouched flake (Fig. 6.37c). One grit-tempered body sherd was recovered, but although large enough for analysis, a cultural affiliation could not be determined. This sherd was found at the contact zone between the plow zone and the subsoil. A small amount of burned earth and burned limestone was also recovered from the units.

Table 6.63. Cultural Material Recovered from 14SH103.

Test Unit Level (cm)	Sur- face	xu1 1 0-10	xu1 2 10-20	xu2 1 0-20	xu2 2 20-30
Shatter		1	-	3	-
Flakes		14	2	24	-
Biface Frag.	1	-	-	-	-
Ret./Ut. Flake	-	1	-	-	-
Ret./Ut. Chip	-	1	-	1	-

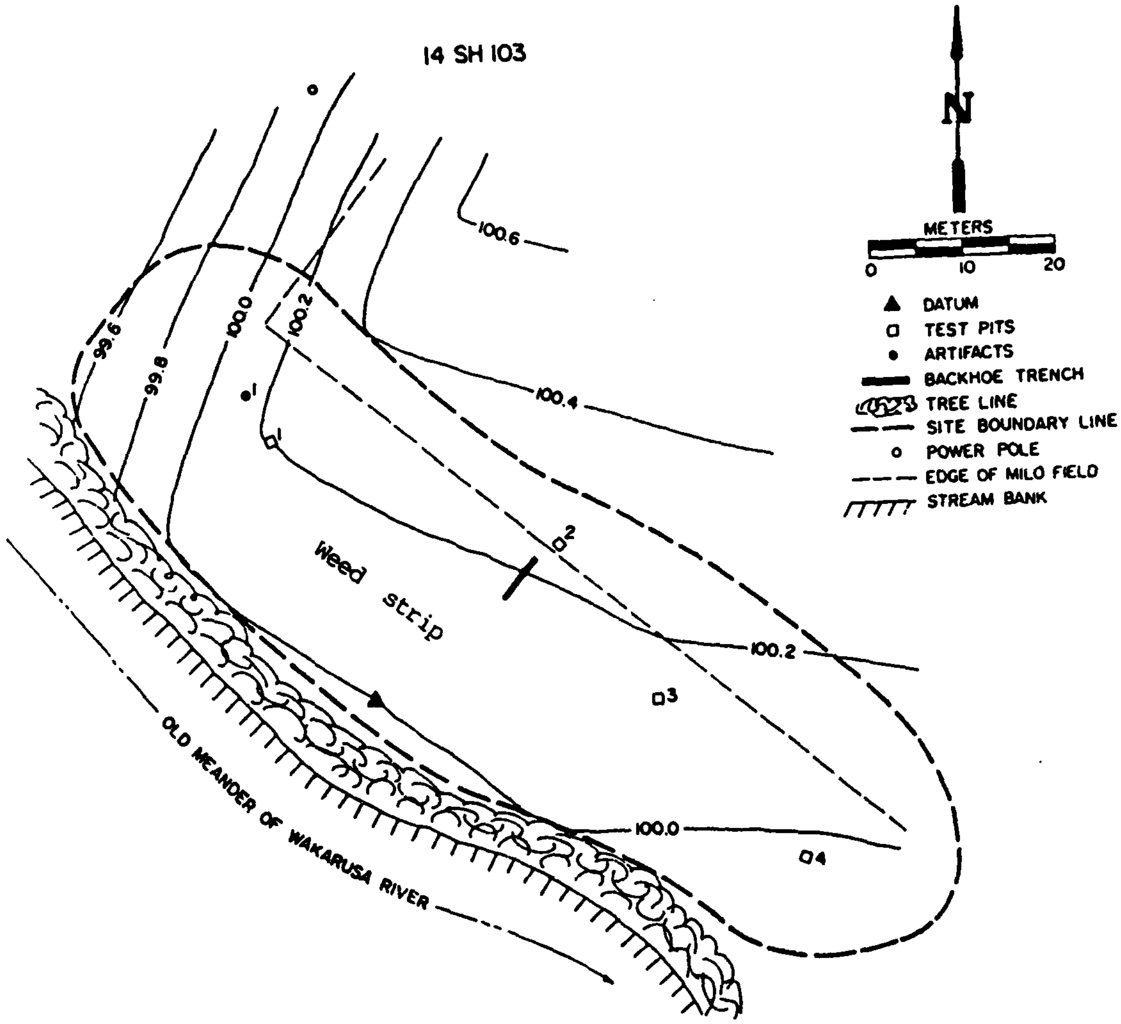


Figure 6.42. Map of 14SH103 showing location of surface find, test units and backhoe trench.

Table 6.63. (cont').

Test Unit Level (cm)	xu3 1 0-10	xu3 2 10-20	xu4 1 0-10	xu4 2 10-20
Sherds	-	-	-	1
Shatter	4	3	-	-
Flakes	20	20	9	-
Proj. Pts.	1	-	-	-
End Scraper	1	-	-	-
Ret./Ut. Flake	1	-	-	-

Interpretations

This site is apparently restricted to the plowzone, and has suffered destruction through cultivation. The side-notched point may be indicative of either a Plains Woodland or a Plains Village occupation, and together with the scraper, suggests the possibility of a hunting camp.

Recommendations

The cultural deposits at 14SH103 are shallow and have been disturbed by plowing. The geomorphic setting is one of a stable surface that could contain cultural material from the Paleoindian period to the present (cf. 14SH101). However, in all but Unit 3, artifact drop-off from the Ap to the Bt horizon was dramatic. This suggests the site has little depth. This assumption was tested, however, by excavation of a backhoe trench. Inspection of the walls of that trench failed to reveal any buried cultural material. Given the low frequency of cultural material, the shallowness of the deposits and their vulnerability to past plowing, this site is not believed to contain sufficient significance or research potential to warrant National Register consideration.

Chapter 7

LITHIC ANALYSES

Lauren W. Ritterbush

Introduction

A major aspect of archaeological analysis of remains of stone age populations necessarily must involve study of lithic artifacts. Lithic artifacts include formal and informal chipped stone tools, by-products of their manufacture, and groundstone tools. This chapter will deal with analyses of these artifacts recovered from each of the sites included in the Clinton Lake Archaeological Project.

The goal of the analysis of chipped stone debitage, informal and formal chipped stone tools, and groundstone tools for this project has been to describe these lithic assemblages and provide data relevant to the research goals of the Clinton Lake Archaeological Project. In some cases, formal chipped stone tools serve as diagnostic indicators of cultural chronology, aiding in the reconstruction of the culture history of the study area. Chipped stone and groundstone tools, as well as debitage, can also be used to determine past activities that occurred at a site. This in turn can help in the interpretation of site function. Debitage analysis is also especially important in reconstructing stages of chipped stone tool production and maintenance. A major aspect of this is the procurement of suitable raw materials for lithic tool production. The analyses described herein include descriptions of types and relative abundances of various stone resources at each site (Appendix 3) in order to determine past preference for and/or distribution of raw materials in the study area. These studies, in turn, provide data for the study of settlement patterns.

The lithic analyses involved description and analysis of debitage and of chipped stone and groundstone tools. Analyses of debitage recovered from the sites described herein were conducted by the author and analyses of chipped stone and groundstone tools were completed by Steven Bozarth. Final compilation of data from the lithic analyses were completed by the author. Debitage analysis involved sorting pieces into categories of flakes, shatter, tested pieces, and cores, and potlids (see definitions below). Artifacts of these types include utilized and retouched flakes, shatter, and cores. Although described and analyzed as informal tools, retouched/ utilized pieces are also included in analysis of debitage under the assumption that these pieces (flakes, shatter, and cores) were originally produced as debitage or waste by-products of chipped stone flaking activities and were only later fortuitously selected for use as informal tools.

For each item in the lithic assemblage, a number of attri-

butes was described and recorded. Primary interests of this project include the identification of utilized lithic material types and presence or absence of heat modification. The lithic raw material categories used in describing chipped stone debitage and tools include Plattsmouth, Toronto, white, Winterset, exotic, and indeterminate. Plattsmouth and Toronto cherts are described in the structural geology section of Chapter 2. These cherts are generally recognizable based on color, texture, homogeneity, and fossil inclusions. Much variability within each of these categories, however, was noted during the analysis. The category of white cherts is used in consideration of some of this variability. Toronto cherts are known to occasionally grade into a white form. In a very few cases, chunks of Plattsmouth may have distinct edges of white, fossil-free chert. Several non-local or exotic cherts occasionally found in this region may also be white. Those white materials that are extremely fine-grained, fossil-free, and of a homogeneous texture, sometimes exhibiting almost glossy surfaces, can generally be recognized as exotic materials, however, other white lithic materials may not always be so recognized. The category of "white" has therefore, been included in this analysis. With very specialized analyses perhaps these materials could be more specifically identified as white forms of Toronto, Plattsmouth, or exotic cherts. The fourth lithic material category is Winterset chert, derived from the Winterset limestone member of the Kansas City group of Upper Pennsylvanian deposits (Reid 1980b). This chert is generally quite distinctive, varying in color from light to very dark bluish gray with a smooth, homogeneous texture. Inclusions include white calcite "stripes" and occasionally silicified fossils. The "core area" of this material is in the Kansas City area (Reid 1980b). The category of other or exotic materials consists of non-local lithic materials not identified more specifically. Finally, a category of indeterminate was included for materials of unidentifiable type. Often very small pieces with no diagnostic characteristics or thoroughly burned pieces were necessarily included in this category.

Evidence of heat modification of lithic materials was noted for each lithic artifact as a measure of the possible use of thermal pretreatment of lithic materials to improve flaking qualities (Crabtree and Butler 1964; Mandeville 1973; Purdy 1974; Bleed and Meier 1980). One category of heat modified materials identified in this analysis was lithic artifacts showing extensive modification by heat. These artifacts were identified by various reddish shades (Johnson _et al._ 1972:311) or blackening, in extreme cases, and/or presence of potlid fractures. Also included in this category were pieces that showed only minor heat modification in the form of reddened edges on less that 50% of the artifact. Throughout the following description of lithic assemblages from each site, the two categories have been quantified together as evidence for thermal pretreatment of lithic materials and/or accidental heat modification due to natural fires or accidental placement of debitage near human fires. The latter category of edge red-

dened artifacts was noted only as a possible means of determining what percentage of heat modified materials were partially and possibly accidentally exposed to fire or burning. This will be discussed further in this chapter. Artifacts showing no reddening or blackening displayed no other signs of heat modification, such as a glossy or lusterous flake surfaces, therefore, are assumed to not have been heat treated.

Analysis of debitage included description of debitage type, flakes, shatter, cores, tested pieces, and potlids. The category of flakes was further divided into flakes and flake fragments, chips, blades, and bifacial retouch flakes (each of which may also be identified as retouched/utilized) (see definitions below). Chips, blades, and bifacial retouch flakes are specialized types of flakes that are found in limited quantities at each site and are often very difficult to define if not complete. A discussion of these flake types, therefore, has been omitted from this chapter and chips, blades, and bifacial retouch flakes have been included, along with flake fragments and retouched/utilized flakes, chips, and blades in the more general category of flakes.

A final aspect of debitage analysis involved determination of the presence or absence of cortex on the dorsal surface and platform of all complete flakes (including chips, blades, bifacial retouch flakes, and retouched/utilized flakes, chips, and blades). Primary decortication flakes were identified as flakes with 100% cortex on their dorsal surface and striking platform. These flakes could only have been removed from original lithic raw material in the earliest stage of lithic reduction and/or chipped stone tool manufacture. Tertiary or interior flakes, on the other hand, have no cortex surfaces, indicating all cortex had been removed from the lithic material through prior flaking activities. Finally, all flakes with some cortex on their dorsal surface and/or striking platform are considered to be secondary flakes, indicating intermediate stages of the reduction sequence of chipped stone tool production. The lithic assemblages from many of the sites investigated here include only a small sample of complete flakes (perhaps due to disturbances such as plowing), therefore, only tentative conclusion based on the above information can be given. It should also be noted that cortex on many of the lithic materials available in this region (e.g., Plattsmouth and Toronto cherts) is often difficult to distinguish and can sometimes be mistaken for a burning rind on heated chert or natural inclusions in the chert.

Lithic tools have been identified as informal and formal chipped stone tools and groundstone tools. Informal tools generally consist of retouched and/or utilized flakes, chips, blades, shatter, cores and core fragments, and natural chunks, as well as notches and gravers made on flakes, shatter, cores, and chunks. Formal tools consist of patterned artifacts, modified such that the shape of the final tool is more a result of human modification than of the shape of the original raw

material. Formal tools can be important in defining site activities and occasionally are diagnostic of cultural periods. Definition of more specific lithic artifact types utilized in this research are given below.

Definitions

FLAKE-piece of lithic material removed from a mass of lithic raw material through force of percussion or pressure and exhibiting one or more of the following characteristics: a)striking platform, b)bulb of percussion, c)compression rings or ripple marks on the ventral face, d)erralieure scar, e)thin termination edge.

CHIP-a flake measuring less than two centimeters in length along the flaking axis. This is an arbitrary size distinction useful for identifying flakes generally too small to be utilized, especially without hafting, and flakes often (although not exclusively) produced through pressure flaking techniques.

BLADE-elongate flake with a length equal to or greater than twice the flake width and with nearly parallel lateral edges and dorsal flake scars.

BIFACIAL RETOUCH FLAKE-(sharpening flake)-a specialized flake, removed from the edge of a bifacial tool in order to sharpen that tool, thereby exhibiting bifacial flake scars on the striking platform and dorsal surface. Often these flakes will be thin and have a lip.

SHATTER-any piece of chunky or irregularly shaped lithic material exhibiting at least one non-cortical surface, yet which lacks definite flake scars, negative bulbs of percussion, or striking platforms.

CORE-a piece of lithic raw material exhibiting at least three well-defined flake scars and recognizable striking platform.

TESTED PIECE-piece of lithic raw material with two or fewer flake scars and no regular shape or systematically placed flake scars.

POTLID-an often flattened, conical-shaped piece of heated lithic material produced through spalling of lithic materials exposed to high temperatures.

RETOUCHED/UTILIZED TOOL-any chipped stone blank (e.g., flake, shatter, core) with at least 10 mm of continuous retouch or use wear.

NOTCH-any chipped stone blank with marginal retouch producing one or more concave notches along the blank's edge.

GRAVER-any chipped stone blank retouched to produce a

pronounced, sharp, angular projection.

PREFORM-a flake, piece of shatter, core, or natural chunk that has been retouched to produce a symmetrically-shaped artifact for utilization or further modification.

BIFACE-a chipped stone artifact with continuous or discontinuous bifacial flaking around the entire tool perimeter.

KNIFE-elongate biface showing signs of utilization along one or more of the linear edges.

PROJECTILE POINT-triangular often bifacial tool with a sharp tip, well-defined blade of two converging working edges, and often a basal hafting element.

DRILL-chipped stone blank, often bifacial, retouched to produce a long bit and sharp point.

HOE-a large biface with convex to pointed working edge.

UNIFACE-chipped stone blank retouched on only one face (unifacially retouched).

END SCRAPER-a chipped stone blank retouched on only one face to produce a relatively steep, regularly-shaped straight to convex working edge on one end.

SIDE SCRAPER-a chipped stone blank retouched on only one face to produce a relatively steep, regularly-shaped straight to convex working edge on either one or both lateral edges.

DISTAL-LATERAL SCRAPER-a chipped stone blank retouched on only one face to produce a relatively steep, regulary-shaped straight to convex working edges on one or both lateral edges and one end.

HAMMERSTONE-a hand-held stone of hard, often crystalline, material showing signs of percussion wear along one or more surfaces.

MANO-a hand-held stone of granular texture with at least one smoothed, flat surface used in grinding.

ABRADER-any piece of coarse or granular stone with a smooth, flat or grooved working surface used for abrasion.

Lithic Assemblage Descriptions

14DO15

A total of 216 pieces of debitage was recovered from four excavation units at 14DO15. Few to none of the debitage were found in the lower levels from 20-40 cm below surface. The debitage assemblage consists of 74.5% flakes, 25.0% shatter,

and 0.5% potlids. The majority of the debitage (88.4%) was of Plattsmouth chert with minor proportions of Toronto (6.5%). The remaining materials were of the above described white chert (0.9%), an exotic material (0.5%), and indeterminate types (3.7%). Heat modification was noted on approximately half of the debitage (46.8%) and a single potlid was found at the site. The amount of cortex present on complete flakes indicates all stages of the lithic reduction sequence. Primary reduction, however, appears to have been a minor activity at the site with only 1.9% of the complete flakes being primary decortication flakes and no cores or tested materials were recovered.

The sample of chipped stone tools from 14DO15 consists of five informal tools (retouched/utilized flakes) and two fragmentary tools--the distal portions of a knife and a biface. These two tool fragments were made from local materials, heat treated Plattsmouth and unheated Toronto. The base of a side-notched arrow point composed of Winterset chert was also recovered from the site (Fig. 6.2d).

A functional interpretation of 14DO15 based on the lithic assemblage is limited by sample size and variety of tools found during the excavations. Chipped stone tool production and maintenance did occur at the site. Flakes and retouched flakes served as informal tools, probably for a variety of activities. The projectile point indicates reliance on hunting as a means of subsistence and the knife may indicate butchering and/or processing of game.

14DO16

Flakes make up 69.3% of the sample of 192 pieces of debitage from 14DO16, while shatter (29.2%), tested material (1.0%), and a potlid (0.5%) make up the remainder of the sample. Plattsmouth chert is found as natural pieces at the site and was the most common (69.8%) lithic material found among the debitage. Toronto was also present in 13.5% of the sample along with minor amounts of white chert (3.6%) and exotics (3.1%). 65.6% of the debitage shows no signs of heat modification although the remaining 34.4% was heat modified. Toronto appears more commonly to have been heated (53.8%) than Plattsmouth (26.9%). The exotic cherts were also heated occasionally. Within the lithic assemblage, 24.5% of the flakes were complete. A large number of these flakes were tertiary (57.4%) and secondary (34.0%) flakes indicating the final stages of tool manufacture or tool maintenance were performed here. Primary decortication flakes occur in minor amounts (8.5%) and only two tested pieces and no cores were found at the site. Some natural chert chunks are found at and near the site.

Informal tools (5) are slightly more common at this site than formal tools (3). Perhaps informal tools were used more often because lithic raw material was available at the site and could quickly and easily be utilized or retouched for various

tasks. Three biface fragments were recovered from the site. Each of these tool fragments show signs of heat modification and are composed of local (Plattsmouth and Toronto) and non-local (Winterset) materials.

Activities at 14DO16 included various stages of stone tool manufacture and maintenance. The bifaces and informal tools could have been used in a number of different activities, including wood working, as represented by a single notched flake.

14DO19

Two hundred and ten debitage artifacts were recovered from three distinct areas and four excavation units at 14DO19. The largest assemblage of debitage came from Area B on the western edge of the site. This area is deflated and eroded, possibly concentrating artifacts in the upper level (plow zone). The most common lithic material utilized in this area (93.3%) was Plattsmouth chert with approximately half (47.2%) of this material showing signs of heat modification. Small amounts (3.7%) of Toronto chert were found and exotic and white cherts were represented by only one artifact apiece. No signs of primary reduction were found among the lithics from this area. Natural pieces of chert are not common in this locality or at the site as a whole.

Formal and informal tools were found in Area B, including three retouched/utilized flakes and chips, a knife and knife fragment (*Fig. 6.2g*) and three projectile points. The knife, knife fragment, and one projectile point were recovered from the surface of this site area. The former artifacts are composed of heat modified and unheated Plattsmouth chert. The projectile point recovered from the surface of the site consists of the proximal portion of a stemmed point made of Toronto chert (Fig. 6.6a). The other two points are a side-notched point of Plattsmouth (Fig. 6.2e) and a triangular unnotched point of Plattsmouth.

Area A is located around a daub concentration northeast of Area B. Debitage is not as common here and two of the excavation units (5 & 6) had a very low lithic artifact count. Nearby Units 7 and 8 were in an area of heavy daub concentration. Level 1 (0-20 cm below surface; plow zone) had the heaviest concentration of debitage with 45 pieces recovered from Unit 7. Only one piece of debitage is recorded for Unit 8, Level 1, but this low frequency is due to the loss of a bag of artifacts from this level. Below 20 cm, few pieces of debitage were found although daub was still common. The loss of a bag of artifacts skews the data somewhat, but if this unit is omitted from the analysis Plattsmouth is found to be the prefered material for stone tool production (66.7%) in Area A. Other materials, such as Toronto (7.5%), white chert (9.0%), and exotics (1.5%), are also found in this area, but only in minor quantities. The majority (81.8%) of the lithics shows signs of

heat modification although only 55.8% of the Plattsmouth has been heat modified. The sample of complete flakes totals only 11 artifacts and includes only one primary decortication flake. Secondary and tertiary flakes form the remainder of the sample of complete flakes. No cores or tested materials were recovered from this area.

The only tools recovered from Area A were from excavations Units 7 and 8. These include a single retouched/utilized flake, two biface fragments, one end scraper, and two projectile points. The biface fragments and end scraper are each composed of heat modified Plattsmouth. One of the projectile points was noted while excavating Level 1 of Unit 8, but was subsequently lost. The remaining projectile point is an unnotched triangular point of Plattsmouth from the upper level of adjacent Unit 7.

Area C, located on the eastern edge of the overall site area, contained a very small amount of debitage. The debitage sample from this area consists of three pieces of heated Plattsmouth shatter and two flakes of Toronto. An additional four flakes (two of which were possibly utilized) were recovered at depths of 65, 71, and 75 cm in Trench 3 in this area, indicating an earlier occupation at the site.

A single formal tool, a projectile point, was recovered from this portion of the site. This point is a side-notched point of white chert. Interestingly this tool was recovered from a lower level (40-50 cm below surface) of one unit.

Spatial differences in distribution of artifacts are apparent from the lithic data described above. The heaviest concentration of lithics is found in Area B. Debitage provides evidence of stone tool production and maintenance in this area and the tools recovered provide evidence for other activities, including game procurement and processing. The informal tools recovered may have served a number of related or unrelated functions. Lithic artifacts are not as common in Area A, possibly related to the presence of a structure at this location. Again stone tool production appears to have occurred here, although on a smaller scale. The scraper recovered from this area may be related to the cleaning of hides and the two projectile points indicate that hunting was practiced by the occupants of the site. The latter is true for Area C also.

Despite spatial differences in tool types, projectile points recovered from each area indicate occupation during the same period. The side-notched and unnotched points, as well as the end scraper, are diagnostic of the Plains Village period (O'Brien 1984:117; Chapman 1980:310-311). Stemmed points may occur earlier, but also are found as late as the Plains Village period.

14DO32

The sample of debitage from 14DO32 consists of 1,420 pieces, three quarters (75.4%) of these are flakes. The majority of the debitage and all the tools were recovered from the surface and plow zone. Some of the remaining pieces of debitage may have been misplaced at lower depths by soil disturbances such as dessication cracks or rodent burrowing. This was true for four of the six flakes recovered from Unit 3, Level 2 (20-30 cm). These flakes were noted _in situ_, oriented vertically in a dessication crack. Similar to many of the other sites investigated in the Clinton area, Plattsmouth chert appears to have been the most commonly (62.3%) utilized lithic material at 14DO32. Toronto chert was also utilized in lesser amounts (28.5%) as were small amounts of white (1.8%) and exotic cherts (1.1%). Approximately half (49.2%) of these materials were heat modified. Primary reduction is evident at the site from a single tested piece, one core, and 13 (4.5%) primary decortication flakes.

Informal tools are abundant at 14DO32--70 retouched/utilized flakes and eight retouched/utilized shatter. Formal tools are also present and include three biface fragments, three knife fragments (e.g., Fig. 6.6d, e), one scraper (Fig. 6.6g), and five projectile points. The projectile points consist of three corner-notched points (Fig. 6.6 b, c, f), two of Plattsmouth and one of an exotic material; an expanding-stemmed point base of Plattsmouth (Fig. 6.6i); and a possible projectile point tip of Toronto. The other formal tools were made of heat modified and unheated Plattsmouth and heat modified Toronto.

Activities at this site included chipped stone tool manufacture and maintenance, animal procurement, and possibly processing of game for meat and hides, as indicated by cutting and scraping tools.

14DO35

A good sample of debitage (4127 pieces) was recovered from 14DO35. This sample consists of 68.9% flakes, 30.5% shatter, 0.2% cores and tested pieces, and 0.5% potlids. Much of this debitage is concentrated in the plow zone. Plattsmouth appears to be the preferred or most easily accessible lithic material (73.8%) with Toronto of secondary importance (24.5%). Minor amounts of white (0.5%) and exotic (0.2%) cherts were also used. Potlids and reddening of the lithic artifacts indicate presence of heat modification on 41.9% of the debitage. Exposure to heat is more common for Toronto chert (50.8%) than Plattsmouth (38.9%). The presence of much debitage at this site gives an initial impression of its having served as an area of primary stone tool production. Primary decortication flakes form a small proportion (4.5%) of the sample of complete flakes. Cores (5) and tested pieces (2) are present in small percentages (0.1% and <0.05% respectively). Three of the cores

and two of the tested pieces were unheated Plattsmouth and the remaining two cores are of heat modified Toronto.

Tools are fairly common at this site with informal tools predominating (80.6% of tool sample). These consist of notches on flakes and shatter, retouched/utilized flakes, retouched/utilized core and core fragments, and retouched/utilized chunks of natural chert. Formal tools consist of bifaces; biface, knife, and uniface fragments; scrapers, and projectile points. Four projectile points were recovered from the surface of the site and consist of two unnotched, one side-notched, and one stemmed point (Fig. 6.13a, b, c; Fig. 6.6h). The material types of these points were Toronto, Plattsmouth, and heated and unheated white chert. The other formal tools were made primarily of local materials, Plattsmouth and Toronto chert, heated and not, although a few tools were also made of unidentifiable white chert and exotic materials. Several non-chipped stone tools were also recovered. These include three hammerstones, one mano, and one possible abrader.

The lithic assemblage from 14DO35 represents a wide variety of activities. Debitage and hammerstones indicate stone tool manufacture and maintenance. As noted above, evidence for the initial stages of stone tool production does exist. Local lithic materials appear to have been selected from or near the site and used in the manufacture of stone tools. The large number of informal tools and large amount of debitage may have resulted from an abundance of raw material at or near the site and fortuitous use of flakes, shatter, and cores as tools. The abrader and 11 notches from the site were undoubtedly used in scraping and shaping relatively soft materials such as wood. Formal tools, such as projectile points, knife fragments, and scrapers, would have been used in animal procurement and processing of game for meat and hides. Processing of plant foods is also apparent from a mano.

The presence of side-notched and unnotched points indicates a Plains Village occupation at this site. The stemmed point may be from an earlier occupation, although stemmed points do occur well into the Ceramic periods (Chapman 1980:306-313).

<u>14DO37</u>

A total of 505 pieces of debitage were recovered from 14DO37. From the deeper units (those excavated below plow zone), 94.2% of the debitage was recovered from the upper levels. The debitage recovered from below these levels may have been misplaced through the actions of rodents, as noted during excavation for two flakes recovered from Unit 2, Level 2. Rodent and root disturbances were noted in lower levels of all units excavated below plow zone. The predominate material type in the debitage sample was Plattsmouth (79.4%). Toronto occurred in 14.5% of the sample. Only two (0.4%) pieces of debitage were of white and six (1.2%) of exotic cherts. Heating

was common, but did not predominate (38.4% of the debitage shows signs of heat modification). Potlids are not present. The sample of complete flakes indicates that a major portion (61.1%) of flakes had no cortex. Primary reduction is represented by six or 6.3% of the complete flakes. No cores were recovered in the test excavations and only one tested piece was found. Small amounts of unmodified chert were noted at the site although much of this was in the form of pebbles.

All tools, except one biface fragment, were recovered from the plow zone. The sample of informal tools consists of one graver, three notches, 18 retouched/utilized flakes, and one retouched/ utilized blade. These tools outnumber formal tools, which consist of five biface fragments, one biface, and one chopper. The lithic raw materials used for these formal tools consist of heated and unheated Plattsmouth and one of heated Toronto. A single quartzite hammerstone was also recovered from the site.

The hammerstone and debitage provide data for the interpretation of stone tool manufacture and maintenance at this site. In addition, production of other tools, such as those made of bone or wood, is evident from the presence of a graver and notches.

14DO39

Three hundred thirty-three pieces of debitage were recovered from 14DO39, the majority of which (88.3%) consists of flakes. Unlike many of the other sites around Clinton Lake, the most common lithic material used at this site is Toronto chert (83.2%). Plattsmouth occurs in smaller amounts (14.4%) along with very minor amounts of white (0.3%) and exotic (0.3%) cherts. Signs of heat modification do not appear as commonly on the debitage at this site (21.3%). Perhaps this reflects the relatively low percentage of heat modified Toronto (21.1%). Primary reduction is limited, only one or 1.3% of complete flakes had extensive cortex on its dorsal surface while the majority of flakes (64.9%) had no cortex remaining. One small core of Plattsmouth was recovered, but no tested pieces. Natural chert is not common at the site perhaps explaining the low sample size of debitage and limited evidence for primary reduction.

Nearly all the tools recovered from 14DO39 are informal tools, consisting of a graver, notches, and retouched/utilized flakes, chips, blades, and core. The only formal tool recovered was an end scraper made of Toronto chert.

At this site there appears to be fortuitous use of debitage for informal tools, probably used in a variety of tasks. The graver and notches may have been used in manufacturing tools of bone or wood. The scraper was probably used in processing hides. Chipped stone tool manufacture and maintenance occurred.

14DO40

A relatively small sample of debitage (194 pieces) was recovered from 14DO40. Only 56.7% of this sample consists of flakes, while the remainder is shatter. Natural chert does occur at the site and often is indistinguishable from shatter, therefore, causing probable bias in the large amount of shatter. Nearly all the debitage was recovered from the plow zone (upper 20-25 cm). In the unplowed portions of the site, debitage counts decreased with depth, but were found down to a gravel base around 20 cm below surface in one excavation unit. The most common material type found in the debitage sample is Plattsmouth (71.6%), but 25.3% of the sample was of Toronto chert and a small amount (1.5%) of exotic chert. Signs of heat modification appear in only 27.3% of the total sample--42.9% of Toronto was heated while only 20.9% of Plattsmouth was heated. Most complete flakes (90.9%) had no or only partial cortex on their dorsal surfaces indicating that secondary chipped stone reduction prevailed at the site.

No formal chipped stone tools were recovered from this site except a biface fragment composed of an exotic material. Informal tools consist of three retouched/utilized flakes, a notch and utilized shatter, and two retouched/utilized shatter. One quartzite hammerstone was also found.

The paucity of diagnostic data from the lithic assemblage prevents interpretation of site activities beyond stone tool manufacture and maintenance and fortuitous use of debitage as informal tools.

14DO59

The lithic assemblage of 14DO59 consists of no tools and only 15 flakes and three pieces of shatter. The lithic materials utilized were Plattsmouth, heated (4 pieces) and unheated (4 pieces); Toronto, heated (3) and unheated (4); unheated white material (2); and a heated exotic material (1). Due to the small sample of lithic materials from this site, little or nothing can be said about the lithic assemblage or site activities.

14DO61

The small size of the lithic assemblage of this site also precludes interpretations based on this form of data. Recovered from this site were seven flakes, including a retouched/utilized flake, five pieces of shatter, some natural pieces of chert, and one white chert knife fragment recovered from the surface (Fig. 6.13f). Aside from this last artifact, the only lithic material type represented at this site is Plattsmouth chert.

14DO62

A relatively small sample of 128 pieces of debitage was recovered from five excavation units at 14DO62. Debitage from one of these units, the centrally located excavation unit (xu 2), was very sparse. Plattsmouth is the most common (88.3%) lithic material utilized at the site although Toronto (7.0%), white (3.1%), and exotic (0.8%) cherts were also use as lithic raw materials. Heat modification appears in 35.9% of the sample, largely reflecting the heat modification of the most common material type, Plattsmouth (36.3% of which shows signs of heat modification). A small portion of the complete flakes (2 or 6.1%) are primary decortication flakes, while most of the complete flakes are secondary (45.5%) and tertiary (48.5%). A single pebble core of Plattsmouth was found.

Formal and informal tools were recovered from the surface and upper levels of the excavations at 14DO62. These include two pieces of retouched/utilized shatter; the above mentioned core, which may have been utilized or retouched for use; a biface fragment, end scraper (Fig. 6.20a), bifacial hoe (Fig. 6.13g), and preform (Fig. 6.13h). The latter four formal tools were made of two exotic materials, heated Toronto chert, and Plattsmouth chert.

The debitage, core, and preform indicate that all stages of stone tool manufacture and maintenance were performed at this site. In addition, there is evidence for activities involving scraping, such as hide preparation. The bifacial hoe may have been used in a variety of digging activities and may be evidence of horticulture.

14DO68

A relatively small sample of lithic artifacts (129 pieces debitage and one informal tool) were recovered from 14DO68. Most of the lithic artifacts were located in the upper 20 cm or plow zone, but several were found as deep as at least 50 cm bs. Based on this sample, Toronto chert is identified as the preferred lithic material (52.7%), rather than Plattsmouth (44.2%). One piece of debitage was of a white chert (0.8%) and one was of Winterset (0.8%), a lithic material not commonly found in the study area. Heat modification appears for less than half (44.2%) the sample, although half (50.0%) of the Toronto artifacts and 38.6% of the Plattsmouth artifacts are heat modified. No cores or tested material were found to indicate primary chipped stone reduction, although four flakes or 10% of the sample of complete flakes are primary decortication flakes. Early stages of chipped stone production are not, therefore, entirely absent from the site.

The only tool found at this site was a retouched/utilized flake. Activities represented at the site by the lithic assemblage can be interpreted only as stone tool manufacture and maintenance.

14DO75

The entire lithic sample from 14DO75 consists of debitage of Plattsmouth chert and one piece of white chert. Only six flakes, two of which are complete, and four pieces of shatter were recovered.

14DO137

The lithic assemblage of this site is interesting in that it appears to reflect the difference in the physiographic location of this site relative to the others investigated in the Clinton Lake study area. Plattsmouth chert commonly appears in the debitage sample, but the Plattsmouth utilized at this site has somewhat different outward characteristics. This form of Plattsmouth chert is often buff or tan in color, rather than the common gray form. In this regard, this material resembles Toronto except that fossils appear in the matrix, yet are often very small. These morphological differences may reflect differences in local lithology in the Wakarusa River drainage.

As mentioned above, Plattsmouth is common at 14DO137, comprising about one third (27.6%) of the material of the recovered lithic assemblage. Toronto chert, however, is the most commonly identified (69.4%) lithic material. Only minor amounts of white (1.2%) and exotic (0.1%) cherts are found. Nearly half (45.1%) of the lithic sample from this site shows signs of heat modification. Much of the heat modified pieces are of Toronto chert, 50.7% of the Toronto chert showing signs of heat modification.

Lithic artifacts are concentrated in the southwestern or higher portion of the site, but were recovered from all excavation units. Shatter is relatively common (32.0% of the debitage sample), perhaps reflecting close proximity to natural cherts, which fracture into angular chunks. Primary lithic reduction undoubtedly occurred at the site, yet was not the primary activity. Two cores were recovered, but only one or 0.1% of the complete flakes was recognized as a primary decortication flake. Most (69.3%) of the complete flakes were tertiary, indicating activities involving later stages of tool manufacture and tool maintenance.

The chipped stone tools recovered from 14DO137 do not include diagnostic tools. A variety of informal tools on flakes, shatter, a core, and a natural chunk of chert were found. The only formal tool recovered is a biface fragment of heat modified Toronto chert from the area of heaviest artifact concentration. The lack of formal tools from this site precludes the interpretation of site activities beyond tool production and maintenance.

14DO138

A relatively large amount of debitage was recovered from this small site. The site has not been plowed and most of the debitage and tools came from the relatively undisturbed upper 20 cm. The majority of lithic materials (87.3%) came from only two excavation units. Plattsmouth chert definitely comprises the most commonly used lithic material (90.4%) with limited use of Toronto (8.0%) and exotics (0.3% or two pieces). Heat modification is evident in both Plattsmouth and Toronto cherts with nearly equal frequency (31.5% and 35.8% respectively). Initial tool production was not a major activity at this site although 6.5% of the complete flakes were primary decortication flakes and a single core was recovered. Over half of the complete flakes were tertiary.

Tools recovered from 14DO138 include both informal and formal tools. Informal tools consist of notches and retouched/utilized flakes, chips, blades, and shatter. Three biface fragments and two projectile points were also recovered. One of the projectile points is corner-notched and the other is broken below the notches (Fig. 6.20b, c). Both are of burned Plattsmouth while the biface fragments were of unheated Plattsmouth.

Activities at this site can be identified as tool production and maintenance and game procurement.

14DO141

Only 100 pieces of debitage were recovered from this site, 60% flakes and 40% shatter. Plattsmouth predominates the material types utilized at the site (93%), with only small amounts (5%) of Toronto being present. Heat modification does not commonly appear (19% of the debitage sample shows signs of heat modification). Only a few (19) flakes at this site are complete, but this small sample provides evidence for all stages of chipped stone tool manufacture. Primary reduction appears to have been a minor activity at the site as indicated by the low percentage (10.5%) of primary decortication flakes. Chunky natural Plattsmouth chert is present at the site.

Informal tools from 14DO141 consist of one notch on a flake and one retouched/utilized natural chunk. Formal tools include one biface fragment and one projectile point excavated from the upper level of a single excavation unit. This point is corner-notched (Fig. 6.20d) and composed of Plattsmouth chert. Two other projectile points, two large bifaces, and one distal-lateral scraper were also found on the surface. The points include a square-stemmed point of heated Toronto and a small unnotched point of white chert (Fig. 6.20e, g). The raw material types of the other formal tools are heated and unheated Plattsmouth and unheated Toronto.

Tool production and maintenance appears to be one activity

pursued at this site, apparently utilizing local lithic materials. Other activities involved animal procurement and hide preparation. The small unnotched arrow point is diagnostic of the Plains Village period. The stemmed and corner-notched points are less diagnostic and were utilized during the Archaic, Woodland, and Plains Village periods.

14DO142

The small sample size of debitage (69 pieces) and tools (0) precludes making any definitive interpretations of the function of this site. Lithic reduction, however, is evident with Plattsmouth used exclusively or nearly so (68 pieces of Plattsmouth and 1 piece indeterminate). Much natural Plattsmouth is found at the site, probably originating from outcrops in the adjacent upland slope. This may account for the fairly high frequency of shatter in the lithic assemblage. About one third of the small sample of debitage shows signs of heat modification. The very small sample of complete flakes includes one primary decortication flake, three secondary flakes, and two tertiary flakes. No tools were recovered from 14DO142.

14DO153

No lithic artifacts were recovered from 14DO153.

14DO155

Seven formal tools and 611 pieces of debitage, including 35 utilized pieces, comprise the lithic assemblage described here. The debitage is composed of 58.9% Plattsmouth and 35.5% Toronto chert, with smaller amounts of white (2.6%) and exotic (0.5%) cherts. Less than one third of the Plattsmouth (27.8%) and Toronto (32.3%) show signs of heat modification. The total percentage of heat modified debitage was 29.1%. A sample of debitage consisting of all complete flakes reveals all stages of chipped stone tool production. Primary decortication flakes comprise 3.1% of the sample, secondary flakes 36.7%, and tertiary flakes 60.2%. Five cores provide additional evidence for primary reduction.

Five biface fragments and two distal-lateral scrapers, one with a notch, were found among the lithic tools of this site. All were of heated or unheated local materials. Other notches appear on flakes and natural chunks. The 35 informal tools indicate that flakes, chips, blades, shatter, and cores were often utilized as tools with little or no modification.

Past activities at this site were varied. Informal and formal chipped stone tool production and maintenance is apparent. Informal tools with notches appear to indicate probable use in scraping and shaping wood or similar materials. The two scrapers recovered probably were used in the processing of hides.

14DO157

A sample of 368 pieces of debitage was recovered from 14DO157, however, only 26.6% of this consists of flakes, the remainder of shatter (72.8%) and potlids (0.5%). The high percentage of shatter may reflect the high incidence of natural chert eroding out of the adjacent bedrock slope. It is often difficult to distinguish natural chunks of local chert from shatter caused by "flintknapping" activities. This should be kept in mind in the analysis and interpretation of this site, as the sample size of bona fide lithic artifacts may be quite small. Plattsmouth is definitely the most prevalent material at the site (97.3%), but Toronto is also present (2.2%). If the naturally occurring chunks of chert (composed of Plattsmouth) could be completely eliminated from the sample, Toronto would be apparent in higher proportions. Other materials are not unknown at 14DO157 and white (0.3%) and exotic (0.3%) cherts are found in very low quantities. Plattsmouth artifacts show signs of heat modification (25.7%) as does a small sample (2.5%) of Toronto. 40.8% of the debitage consists of complete flakes, 10% of which are primary decortication flakes, 55% secondary flakes, and 35% tertiary flakes. No cores or tested material were recovered, but chert does appear in close proximity to the site. Some primary reduction likely occurred in the past as shown by the primary decortication flakes.

Ten retouched/utilized shatter and one retouched/utilized chunk indicate fortuitous use of easily available materials with little or no modification. This is also apparent from the presence of two retouched/utilized flakes, a notched flake, and a notched piece of shatter. More formal tools were also made and used at this site. A single biface/projectile point (possibly part of a corner-notched point) of heated Toronto was found.

Chipped stone tool production appears to have been an important activity at the site, as well as tool maintenance. Scraping and shaping wood for tools may have occurred. Game procurement also is likely.

14DO309

Despite the excavation of 12 units at this site, the sample of debitage is not extremely large (296 pieces), especially considering that over half (55.7%) of the sample consists of shatter. Natural chert (Plattsmouth) outcrops at the site and was found in each test unit. It was somewhat difficult to distinguish some blocky natural chert from culturally derived shatter. The sample, therefore, may be skewed somewhat by the presence of naturally derived Plattsmouth shatter/chunks. Tentative interpretations of site activities are presented however. Chipped stone tool production did occur at the site with a preference shown for Plattsmouth chert (86.1%). This reflects usage of local lithic materials. Toronto chert also appears in the sample (10.8%) as do minor amounts of white (0.7%) and exotic (0.7%) cherts. Two pieces of exotic chert appear to

have been heat treated as was 20.8% of Plattsmouth and a large percentage (71.9%) of Toronto artifacts. (Again the presence of natural Plattsmouth chert in the debitage sample may account for this reduced percentage of heating of Plattsmouth materials.) One would expect evidence for primary reduction to be present since lithic raw materials occur at the site and indeed it is indicated by the presence of one Plattsmouth core and five primary decortication flakes of Plattsmouth and an indeterminate lithic material.

Informal tools predominate in the chipped stone tool collection. These include one notched flake, six retouched/utilized flakes, and four retouched/utilized pieces of shatter. Formal tools consist of one projectile point and one distal-lateral scraper (Fig. 6.20h, i). The former has a contracting stemmed base and is of Plattsmouth chert. The scraper is of an exotic material. Both were recovered from the surface of the site.

A major activity at this site appears to be chipped stone tool production and maintenance, relying heavily on use of local materials. Various activities, such as shaping wood, may be represented by the informal tools. Animal procurement and hide preparation are also apparent.

<u>14SH5</u>

The sample of debitage from 14SH5 is small, consisting of 96 pieces, 42.7% of which is shatter. Some natural chert is present at the site. Conclusions based on these facts must be tentative. Plattsmouth (65.6%), Toronto (20.8%), and very minor amounts of exotic cherts (1.0%) were used in the production of chipped stone tools at this locality. Plattsmouth chert appears to have been most commonly utilized. Plattsmouth was occasionally heated (31.7%) as was Toronto, yet apparently less frequently (15.0%). Of the few (24) complete flakes recovered; two-thirds (or 16) are tertiary, although one primary and seven secondary flakes are also present.

The lithic tool assemblage from this site consists of one retouched/utilized flake, one retouched/utilized chip, one biface fragment (Fig. 6.20j), and two projectile points. One of the projectile points consists merely of a tip and the other has one side notch and one basal notch (Fig. 6.20k). These were composed of Plattsmouth and an exotic chert. The biface is also composed of Plattsmouth.

Lithic tool production and maintenance and probable animal procurement and processing occurred at this site.

<u>14SH6</u>

The lithic assemblage from this site is too small to allow meaningful interpretations. Suffice it to say, 18 flakes, chips, and blades and seven pieces of shatter were recovered

from four excavation units at this site. Plattsmouth and Toronto cherts are both present in the assemblage and both show some evidence of heat treatment. No cores or tested pieces were recovered, although primary decortication flakes are present. A single heat modified Plattsmouth biface fragment was found.

14SH101

A large sample of 1,099 pieces of debitage was recovered from 14SH101. Flakes comprise 76.4% of the sample while shatter makes up 22.9% and cores and potlids 0.4% and 0.3% respectively. These materials were recovered from eight excavation units in Area A, as well as a single feature from two excavation units in that same area, and two excavation units in Area B. The latter units yielded only 1.4% of the sample and the feature yielded 7.8% of the sample.

Plattsmouth chert is the most common lithic material utilized at the site (63.6%), but a variety of other materials are identified, including Toronto (28.7%), white (1.0%), various exotics (3.4%), and one (<0.1%) shattered piece of burned Winterset. Heat modification appears on 31.8% of the debitage, largely reflecting the heating of Plattsmouth (31.8%) and Toronto (34.0%). As might be expected, heat modification is more commonly observed on materials from the feature (59.3% of the debitage from Feature 1). This probably represents accidental burning of discarded debitage rather than thermal pretreatment of materials to increase favorable flaking qualities. The lithic material types recognized for artifacts from the feature are as varied as those from the site as a whole, with Plattsmouth appearing most commonly (74.4% of lithics from Feature 1). Also present are Toronto (17.4%), one white (1.2%), two pieces of exotic chert (2.4%), and the remainder indeterminate.

From the entire site were recovered four cores, three of Plattsmouth and one of Toronto. These indicate that the earliest stages of chipped stone tool production, utilizing local lithic materials, did occur at the site. Five or 2.2% of the complete flakes were primary decortication flakes, providing further evidence for primary tool production.

Lithic tools are fairly abundant at 14SH101, although none was recovered from Area B. A single unnotched triangular point of white chert (Fig. 6.36f) was recovered from the surface of Area C. No excavations were conducted in this area as no other artifacts were noted on the surface. One projectile point, one biface (Fig. 6.36e), and one biface fragment were collected from the surface of Area A. These tools were made of local materials, Toronto and Plattsmouth cherts. The projectile point recovered from the surface of Area A was a Scallorn point with an incomplete base and serrate edges (Fig. 6.36j). One quartzite hammerstone and one sandstone mano were also found on the surface.

Excavations in Area A uncovered, one notched flake, one notched piece of shatter, seven retouched/utilized flakes, one retouched/utilized chip, two retouched/utilized blades, two retouched/utilized pieces of shatter, and one retouched/utilized core. All informal tools were of local materials, Plattsmouth and Toronto chert. Formal tools include four biface fragments and two bifaces (Fig. 6.36e, p), one knife fragment, one drill (Fig. 6.36o), and four projectile points. The four excavated points include the base of a small unnotched (Fig. 6.36g) and a small corner-notched point of extensively heated Toronto (Fig. 6.36h), a serrate Scallorn point of unheated Toronto (Fig. 6.36k), and a small unnotched point of Plattsmouth (Fig. 6.36e). All other formal tools are local materials except the drill, which is made of a heated exotic material. A single hammerstone of burned quartzite was excavated in Area A.

Debitage was found below the plow zone, although in low frequency, yet nearly all tools occurred in the plow zone. Exceptions to the latter were the tools recovered from Feature 1. These include three informal tools--a notched flake, retouched/utilized flake, and one piece of shatter showing signs of retouch or utilization--and a biface and complete projectile point. The point is a small Scallorn with one serrate edge and touch or utilization--and a biface and complete projectile point. The point is a small Scallorn with one serrate edge and is composed of white chert (Fig. 6.361). The biface is of Winterset chert (Fig. 6.36n) and the informal tools are of heated and unheated Plattsmouth.

As a whole, the debitage and tools from 14SH101 indicate that a variety of activities occurred at this site. The hammerstone, cores, and other debitage indicate chipped stone tool production and maintenance. Sone of the debitage apparently was selected for use as simple tools, perhaps for scraping and shaping wood and other materials and cutting plant materials, hides, and/or meat. A single knife fragment was also probably used in cutting and the drill may have been used in puncturing or drilling. The stone mano provides evidence of plant food preparation. Hunting served as a means of procuring food for the past occupants of this site. The functional relationship of the single small projectile point recovered from the feature to other artifacts in the feature is unknown.

Several Scallorn points, including one from Feature 1, were found at this site. These are diagnostic of the Plains Woodland period (O'Brien 1984:113; Chapman 1980:312), providing solid evidence for Woodland occupation of 14SH101. The two small unnotched points recovered from 14SH101 are similar to Plains Village arrow points (Chapman 1980:310; O'Brien 1984:117,126). A later occupation may also be present at this site.

14SH102

No lithic artifacts were recovered from this site.

14SH103

A small sample of debitage (100 pieces) was recovered from this site, and flakes make up a large percentage (89%) of it. Lithic materials selected in the manufacture of stone tools include Plattsmouth (46%), Toronto (36%), exotic (12%), white (3%), and indeterminate cherts (3%). If the sample size is representative of all debitage at the site, it is interesting that Plattsmouth and Toronto cherts appear to have been selected with relatively similar frequency and that exotic materials were also used quite commonly. In this regard, the assemblage is comparable to that from 14SH101. Heat modification appears frequently (42%), Plattsmouth (21 pieces or 45.7% of the sample of Plattsmouth) and Toronto (18 pieces or 50.0% of the sample of Toronto) being fairly similar in this regard. The sample of complete flakes from this site includes no primary decortication flakes, and no cores or tested pieces.

Excavated chipped stone tools include one notched and utilized flake and four retouched/utilized flakes of local materials (e.g., Fig. 6.37c). Recovered from the surface of the site was one biface fragment of white chert (Fig. 6.37a). Excavated formal tools include one projectile point and one distal-lateral scraper (Fig. 6.37d). The former was a small side-notched arrow point composed of heated Toronto (Fig. 6.37b). This type of point was common in the Plains Village period (O'Brien 1984:117; Chapman 1980:311), thereby indicating a Plains Village occupation at this site. The scraper was of unheated Toronto.

It is difficult to say with much certainty what activities occurred at this site based on the small lithic assemblage. Chipped stone tool maintenance and the final stages of stone tool production are evident. Chipped stone tools from the site also indicate that game procurement and hide processing activities were pursued by the site occupants.

Comparison and Summary

Lithic assemblages were recovered from 24 sites in the study area during the Clinton Lake Archaeological Project. Comparison of these assemblages reveals similarities in the types of lithic raw materials used in the manufacture of chipped stone tools and in the form of some tool types. For the purpose of this discussion, lithic assemblages including 100 or less pieces of debitage were arbitrarily determined to be too small to provide representative samples for comparison. Although representative sample size is dependent on site size, function, and other variables, it was felt that samples containing 100 or fewer pieces of debitage were unlikely to be representative since large amounts of debitage are produced during tool making activities. Lithic data from sites 14DO59, 14DO61, 14DO75, 14DO141, 14DO142, 14SH5, 14SH6, and 14SH103, therefore, have been omitted from this discussion.

Lithic resource procurement and the preference for certain types of local raw materials for tool production are two topics which can be addressed in this discussion of prehistoric utilization of lithic materials at 16 sites in the Clinton Lake area. These topics are each related to the study of settlement patterns, as the location of lithic resources undoubtedly exerted some influence over site selection in many instances. Both Plattsmouth and Toronto cherts have been identified in the lithic assemblages of the Clinton Lake sites. This appears to largely be a reflection of local lithology. In nearly all cases, Plattsmouth chert comprises over 50% of the lithic materials represented in each site. In fact, the debitage samples from 13 of the 16 sites containing adequate lithic samples were composed of 58.9%-97.3% Plattsmouth chert. The highest percentages of Plattsmouth chert occurred in sites 14DO15 (88.4%), 14DO62 (88.3%), 14D0138 (90.4%), and 14DO157 (97.3%). All but one of these sites is located along Rock Creek. The latter site, 14DO157, has a distinctly higher percentage of Plattsmouth (97.3%) and is located on Deer Creek. This may be explained in part by the presence of natural Plattsmouth chunks eroding out of the adjacent bedrock-controlled slope.

Although Plattsmouth is present at all the Clinton sites, several sites had relatively low percentages of this material in the lithic assemblage. For example, 14DO39 had a drastically lower percentage of Plattsmouth (14.4%) in the debitage sample. None of the nearby sites, 14DO32, 14DO68, and 14DO155, had extremely high percentages of Plattsmouth, but this material made up close to or over half of the debitage sample (62.3%, 44.2%, and 58.9% respectively). This appears to reflect somewhat greater use of Toronto chert, which may outcrop locally in this area. The very high percentage of Toronto (83.2%) and low percentage of Plattsmouth (14.4%) composing the debitage sample at 14DO39 may reflect some type of special activity having been pursued at this site that involved flaking of Toronto chert. This activity may also have been confined to one area of the site itself since debitage composed of Toronto chert distinctly concentrated in excavation Units 1 and 2 at the west end of the site. Plattsmouth artifacts were concentrated in excavation Unit 3. The single formal tool recovered from Unit 2 at this site, an end scraper, is composed of Toronto chert.

Other sites containing lithic assemblages with relatively low percentages of Plattsmouth chert are 14DO137 and 14SH101. 14DO137 is a somewhat unique site in the area because it is located on a high upland prominence, apparently where the composition of exposed bedrock differs from that at lower elevations. The Plattsmouth chert found at this site also differs slightly in color and fossil inclusions from Plattsmouth noted at other sites in the Clinton Lake area. Differences in local lithology, therefore, may explain the relatively low percentage of Plattsmouth (27.6%) and relatively high per-

centage of Toronto (69.4%) present in the debitage assemblage of this site.

The composition of lithic materials utilized at 14SH101 as revealed by debitage composition is 63.6% Plattsmouth, 28.7% Toronto, 3.4% exotics, <0.1% Winterset, 1.0% white, and 3.3% indeterminate. The most obvious observation of lithic material types at this site is the variety of materials utilized. Not only were local materials, such as Plattsmouth and Toronto chert, utilized, but also utilized were a variety of exotic or non-local materials, such as Winterset chert. Compared to other sites investigated in the Clinton Lake Archaeological Project, 14SH101 has a relatively lower percentage of Plattsmouth and higher percentage of Toronto, although Plattsmouth still predominates. This may reflect the close proximity of Toronto in addition to the usual close proximity of Plattsmouth outcrops. No natural lithic materials are present at the site, nor are any known for the immediate area. No comparisons with nearby sites are possible since sites 14SH5, 14SH6, 14SH102, and 14SH103 had lithic assemblages too small to provide meaningful or representative data. (Although a general impression of the small sample from 14SH103 is that it appears somewhat similar in frequency of material types.) Other than the close proximity of both Toronto and Plattsmouth cherts, a possible interpretation of the relative differences in material types for this site compared to others included in this project is longer occupation at this site. If 14SH101 were occupied for longer periods of time than most other sites investigated (as might be apparent from the variety of activities conducted at the site), a sample of lithic materials would be expected to more accurately represent the lithic materials utilized throughout the year rather than those selected at any one particular special activity or short term camp site. The lithic materials identified from 14SH101, therefore, may represent relatively long-term occupation of this locality and more extensive exploitation of Toronto chert than the regionally more abundant Plattsmouth chert. Exotic materials were also utilized when available through trade or direct procurement.

Heat modification appears with some regularity at all sites investigated in the Clinton Lake Archaeological Project. The range of heat modified debitage is from 21.3-49.5%. The lowest percentage of heat modification is present at 14DO39, which also contains the highest percentage of Toronto cherts. This indicates that at this site, and perhaps others, thermal pretreatment was not practiced as extensively with Toronto chert than with others such as Plattsmouth. It is presumed that much of the heat modification of lithic materials resulted from past human activities such as purposeful thermal pretreatment, designed to improve the flaking qualities of the lithic materials (Crabtree and Butler 1964; Mandeville 1973; Purdy 1974, Purdy and Brooks 1971; Bleed and Meier 1980; Hester 1972). Accidental heat modification, however, is possible through exposure of lithic artifacts or raw materials to natural prairie/forest fires or to human fires in or near which lithic artifacts may

have been discarded or misplaced.

In an attempt to distinquish accidental and purposeful heat modification heated artifacts showing only minimal signs of heat alteration, such as marginal reddening of less than 50%, were noted. Often these pieces were fractured along the reddened edges, perhaps resulting from burning of the edge. If the assumption that these pieces were accidentally heat modified rather than purposely heated is correct (assumed because purposeful thermal pretreatment should be expected to be even in order to be effective), then these pieces may give some indication of the extent of naturally caused heat modification at each site and the variability of the extent of natural fires or accidental exposure of lithic materials to fire between sites. Relative percentages of edge modified debitage to all heat modified debitage resulted in percentages from most of the investigated sites of 15.4 to 24.5%. In these cases, the amount of lithic materials with accidental heat modification does appear to be relatively small although present at each site. This is not surprising since natural fires do occur throughout the study area and may be expected to have occurred with relatively similar frequency at each site. A very low percentage of 9.1% at 14DO16 does appear anomalous. The locality of this site does not appear distinctive and an explanation for this is not readily apparent.

Sites with relatively high percentages of edge burned pieces (30.9%, 30.3%, and 34.6%) include 14DO157, 14DO137, and 14DO309. A high incidence of natural fires might be postulated for two of these sites, 14DO137 and 14DO309. 14DO137 is a high upland site that has been partially planted in native grasses. The Corps of Engineers has burned that area at least once, although this occurred last spring (1987), after excavations were completed. Earlier controlled burns possibly occurred, unfortunately are unrecorded (David Rhoades, U.S. Army Corps of Engineers, Clinton Reservoir, personal communication May 16, 1987). 14DO309 is also an upland site, presently located in Clinton Lake State Park. This area has undoubtedly been heavily disturbed in the construction of the State Park campground and annual activities of campers. Burning may have occurred in modern times in related activities at this site. Modern burning has not been recorded at 14DO157, yet perhaps the high percentage of edge reddening among the lithics at this site reflects the small sample of all heat modified material in this particular lithic assemblage.

The distinction between primary decortication flakes, secondary flakes, and tertiary or interior flakes has been made for complete flakes from each of the sites investigated. These data allow reconstruction of the relative importance of primary reduction or the procurement and initial preparation of lithic materials for stone tools to later stages of tool manufacture and tool maintenance. In all sites, secondary and tertiary flakes comprise the largest percentage of the sample of complete flakes (secondary flakes range 29.7-55.0%, tertiary flakes 35.0-

69.3%). This is to be expected as less and often larger pieces of debitage are produced in the initial stages of tool manufacture. Primary flakes, although less numerous, are good indicators of activities involving initial tool production. These flakes would be expected at quarry sites or sites near sources of lithic raw materials. At all sites with adequate lithic samples, primary flakes were found, indicating initial stages of stone tool production. This appears to have been a minor activity in most cases, however, especially at 14DO137 (1.0%). Higher percentages of primary flakes range from about 8.5-14.3%. Four sites having high percentages of primary flakes (14DO16--8.5%, 14DO40--9.1%, 14DO68--10.0%, 14DO157--10.0%) also have the largest samples of complete flakes (respectively 35.3%, 38.1%, 40.0%, 40.8% of the debitage samples). The site with the highest percentage of primary flakes (14.3%) is 14DO309. Lithic raw materials occur at this site, yet debitage is not extremely abundant. The large percentage of primary flakes seems to indicate that primary reduction of local materials occurred at this site, indicating initial tool production was a major activity at this site.

Lithic tool assemblages of the investigated sites often include a number of informal tools. These are commonly of Plattsmouth and/or Toronto chert, the major material types at each site. Because local cherts, especially Plattsmouth, often occur at or near the sites, materials for informal tools were easy to procure and use with little or no retouch. Fortuitous use of debitage as tools apparently was easy and economical. Formal tools also are commonly made of local lithic materials, as well as exotic chert types. Perhaps this indicates primary usage of the Clinton area and surrounding region throughout most of the year and trade with peoples more commonly exploiting other regions. Formal tools often consist of projectile points, bifaces, knives, and scrapers. Groundstone tools are not common, but are present at sites 14DO35, 14DO37, 14DO40, and 14SH101. The largest samples of groundstone tools were recovered from 14DO35 and 14SH101. Both sites are relatively large and appear to have been occupied longer than most of the other tested sites. Single hammerstones were found at 14DO37 and 14DO40, supporting an interpretation of lithic reduction ("flintknapping") at the sites.

Activities inferable for each site from lithic data are often limited to stone tool production and maintenance and animal procurement and processing. These activities, especially stone tool production and maintenance, are common at all the investigated sites. Lithic raw materials occur frequently in the region, therefore, sites may have been selected primarily for their location near sources of usable lithic materials. Although primary reduction is apparent at many sites, none appear to have served solely as quarry sites _per se_. Some may have been located at or near lithic "collection sites" where lithic materials were easily procured and little primary reduction was necessary. Lithic materials may have been fortuitously selected throughout the region and reduced in nearby short-term

campsites.

Projectile points were recovered fairly commonly indicating hunting as a major subsistence activity in the area. Bifaces, knives, and scrapers were used in processing game for meat and hides. Informal tools, such as retouched/utilized flakes and shatter, may have been used in these activities also. They may also have been used in the manufacture of tools; for example, notches may have been used in shaping wood for tools, such as arrowshafts. Given the assemblage recovered during the project, gathering and processing of wild or domesticated plant foods is evident at only two of the sites (14DO35 and 14SH101) containing manos. Possible evidence from the lithic assemblage of horticulture exists at 14DO68 in the form of a bifacial hoe. (This tool may also have been used in nonhorticultural activities, such as digging of postholes, etc.) Activities such as these may have been more extensive, but may not be apparent from the lithic assemblage used in this analysis.

Chapter 8

CERAMIC ANALYSIS

Brad Logan

Introduction

Archaeological testing of 13 of the 27 sites investigated by Kaw Valley Engineering resulted in recovery of only 325 prehistoric ceramic artifacts, including six rim sherds and 319 body sherds (Table 8.1). Most of these sherds are too fragmentary for meaningful analysis. That is, the interior and exterior surfaces have been too reduced by breakage or erosion to permit unqualified determination of such attributes as surface treatment, method of finishing, and presence or absence of smoothing. Moreover, given the fact that firing techniques employed by prehistoric peoples of the Central Plains often resulted in firing clouds and consequent variations in surface color of a vessel, identifications of that attribute on very small sherds would be suspect. Therefore, analysis focuses on those sherds which have a surface dimension (preferably, but not necessarily, both interior and exterior surfaces) equal to or greater than two centimeters. This is a rather arbitrary criterion but one considered liberal for ceramic analysis. Indeed, had the author been presented with greater samples of larger sherds he would have adopted a larger dimension and had correspondingly greater confidence in his interpretation of them. There is a direct correlation between the size of a sherd and its reflection of the various attributes of the vessel from which it comes. The criterion adopted here reduced the sample for detailed analysis to 66 sherds, or 20.3% of the assemblage. Of this total, only three are rim sherds and the remainder are body sherds.

Table 8.1. Sherd Counts by Site and Provenience.

Site No.	Unit No.:Depth (cm)	Number Analyzed	Number Unanalyzed
14DO15	Surface	3	1
14DO15	1:(0-10)	2	5
14DO15	1:(10-20)	0	7
14DO15	2:(0-20)	0	4
14DO15	3:(0-20)	0	4
14DO15	4:(0-20)	0	9
Totals		5	30
14DO16	1:(0-10)	2	4
14DO16	1:(10-20)	1	4
14DO16	1:(20-30)	1	2
14DO16	1:(30-40)	0	1
14DO16	2:(0-10)	0	1
14DO16	3:(0-20)	0	4

Table 8.1. (cont').

Site No.	Unit No.:Depth (cm)	Number Analyzed	Number Unanalyzed
14DO16	5:(0-10)	0	2
14DO16	5:(20-30)	1 (rim)	3
14DO16	5:(30-40)	1	0
14DO16	6:(0-10)	1	1
14DO16	6:(10-20)	2	4
14DO16	6:(20-30)	0	7
Totals		9	33
14DO19	1:(0-20)	0	1
14DO19	2:(0-20)	0	1
14DO19	3:(0-20)	0	1
14DO19	4:(0-20)	1	2
14DO19	6:(0-20)	0	1
14DO19	6:(20-30)	2	1
14DO19	7:(0-20)	2	9
14DO19	7:(20-30)	0	4
14DO19	7:(30-40)	0	1
14DO19	8:(0-10)	1	1 (rim)
Totals		6	22
14DO32	1:(0-10)	1	6
14DO32	2:(0-10)	0	4 (1 rim)
14DO32	3:(0-20)	1	10
14DO32	4:(0-19)	0	4
14DO32	5:(0-25)	1	0
14DO32	6:(0-17)	0	3
14DO32	7:(0-16)	1	2
Totals		4	29
14DO35	3:(0-30)	0	1
14DO35	4:(0-30)	0	19
14DO35	5:(0-25)	0	5
14DO35	7:(0-20)	0	1
14DO35	9:(0-20)	0	2
14DO35	10:(0-20)	0	1
14DO35	11:(0-20)	0	5
14DO35	12:(0-20)	0	1
Totals		0	35
14DO39	Surface	1	1
14DO39	1:(0-10)	2	21 (1 rim)
14DO39	1:(10-20)	1	6
14DO39	1:(20-30)	2	3
14DO39	2:(0-10)	2	6
14DO39	2:(10-20)	2 (1 rim)	5

Table 8.1. (cont')

Site No.	Unit No.:Depth (cm)	Number Analyzed	Number Unanalyzed
14DO39	2:(20-30)	5 (1 rim)	6
14DO39	3:(0-10)	0	2
14DO39	3:(10-20)	0	1
Totals		15	51
14DO40	1:(0-20)	1	2
14DO40	3:(0-25)	1	3
14DO40	5:(0-20)	0	1
Totals		2	6
14DO59	1:(0-10)	1	1
14DO59	1:(10-20)	0	6
14DO59	1:(20-30)	0	2
14DO59	2:(0-10)	2	2
14DO59	3:(0-10)	0	3
Totals		3	14
14DO68	1:(0-20)	1	0
14DO68	3:(0-20)	1	0
14DO68	4:(0-20)	0	2
Totals		2	2
14DO155	4:(0-20)	0	3
14DO155	5:(0-25)	1	2
Totals		1	5
14SH5	2:(0-20)	0	3
14SH5	3:(0-15)	0	1
14SH5	4:(0-15)	0	1
Totals		0	5
14SH101	Surface	3	0
14SH101	2:(0-20)	0	4
14SH101	2:(20-30)	0	2
14SH101	3:(0-20)	1	0
14SH101	4:(0-20)	1	0
14SH101	5:(0-10)	3	9
14SH101	5:(10-20)	3	4
14SH101	6:(0-10)	1	5
14SH101	6:(10-20)	1	0
14SH101	7:(0-10)	3	1
14SH101	8:(0-10)	2	2
Totals		18	27

Table 8.1. (cont').

Site No.	Unit No.:Depth (cm)	Number Analyzed	Number Unanalyzed
14SH103	4:(10-20)	1	0
Totals		1	0
Grand Totals		66 (3 rim)	259 (3 rim)

The sample of analyzed sherds is too small to permit any sophisticated analysis of the ceramic technology of the prehistoric peoples of the Wakarusa River basin. However, they do have value in so far as they provide a means of identifying the cultural affiliation of some of the sites and the activities that occurred at them. Hence, the discussion herein concerns these aspects of the ceramic assemblage. It is based on a comparison of several attributes of the ceramic artifacts to those described by previous archaeologists who have conducted investigations in the project area and its vicinity. Attributes selected for their usefulness in determining the cultural affiliation include eleven discrete and six continuous variables.

Discrete variables recorded on analyzed sherds are: temper, color of slip (if present), color of exterior paste, color of interior paste, presence or absence of carbon streak, type of finishing technique, type of exterior and interior surface treatment, and presence or absence of smoothing over these surfaces. Continuous variables are: body thickness, shoulder thickness, rim thickness, rim height, rim diameter, and lip thickness. In addition, remarks were recorded regarding such distinctive attributes on some sherds as the type of decorative treatment, direction of rim curvature (if any; e.g., incurvate or excurvate), lip form (rounded, flat, etc.), presence of collar, cord width, maximum grain size of coarse sand temper, presence of firing clouds, natural inclusions in the paste, and surface exfoliation.

Temper was examined on clean breaks of the sherd core with a 10x hand lens. Color of slip, exterior paste, and interior paste was determined by comparison of the most prevalent surface color with Munsell Soil Color Charts (1975 edition). Thicknesses (maximum) of sherds were measured with a sliding rule caliper to the nearest millimeter. Rim diameter was measured to nearest centimeter on a circle key, if sufficient arc length was present.

Discussion

The ceramic assemblages examined here represent at least

two wares from a like number of temporal periods, Plains Woodland and Plains Village. Discussion of the assemblages is best made with reference to previous investigations of the local representatives of these time periods. These are the Wakarusa, Deer Creek and Grasshopper Falls phases of the Plains Woodland period and tne Apple Valley, Clinton and May Brook phases (Pomona variant) of the Plains Village period. Sites with ceramic assemblages indicative of these complexes or periods are identified in Table 8.2.

Table 8.2. Site Cultural Affiliation Based on Ceramic Artifacts

Site Number	Suggested Cultural Affiliation*
14DO15	Pomona variant
14DO16	Clinton phase; Plains Woodland?
14DO19	Pomona variant
14DO32	Pomona variant
14DO35	Pomona variant? Plains Woodland?
14DO39	Pomona variant
14DO40	Pomona variant
14DO59	Pomona variant
14DO68	Pomona variant?
14DO155	Pomona variant
14SH101	Plains Woodland
14SH103	?

*Affiliations indicated with a question mark are tentative.

Plains Woodland Ware

Plains Woodland complexes in the Wakarusa River basin and its environs include the Wakarusa, Deer Creek (Johnson 1968) and Grasshopper Falls (Reynolds 1979) phases. The first two centered in the Wakarusa River basin and the last occurred in the Delaware River basin. Ceramics of the Wakarusa and Deer Creek phases are comparable, consisting of relatively thick-walled elongate jars with slightly excurvate rims and rounded lips. Exterior surfaces tend to be overall vertically cord-marked or, occasionally, smoothed over. Interior surfaces are smoothed over. Temper consists of abundant grit and sand (Johnson 1968:132-133).

Somewhat similar ware is characteristic of the Grasshopper Falls phase (Reynolds 1979:70-71). Described as simple utilitarian pottery, the vessels of this phase were also medium to large jars with thickened conical bases. Rim forms differ slightly from those of the Plains Woodland phases in the Wakarusa River basin. Excurvate rims are not described but straight to slightly inverted forms are typical. Exterior

surface treatment is identical to that of the Wakarusa River phases, being cordmarked or smoothed over. The predominant temper consists of dense amounts of grit. Sand and untempered sherds do occur but in low frequency. Decoration is rare and always confined to the lip or neck.

Ceramic artifacts from only one site investigated during the Clinton Lake Archaeological Project compare favorably to those described above. This is 14SH101, a relatively extensive site, compared to most in the study area. A total of 18 analyzable sherds was recovered at the site and the following characteristics identify them as typical Plains Woodland ware. Temper consists of sand (ten) grit (three) sherd (one) or some combination of these aplastics (grit and sand, two; grit and sherd, one). Unlike most Plains Woodland ceramics, sand occurs more frequently than grit. However, given the small sample of sherds, little can be made this aspect of the assemblage. Exterior surface colors are yellow (one), light yellowish brown (seven), brownish yellow (four), very pale brown (three), and brown (three). Interior surface colors show greater variability and run the following spectrum: light yellowish brown (two), yellowish brown (one), very pale brown (two), pale brown (one), brown (three), grayish brown (two), gray (four), dark gray (two), and very dark gray (one). Core colors are invariably a shade of dark gray, reflecting the presence of a carbon streak. With one exception, all sherds showed evidence of finishing with the paddle-and-anvil technique. Exterior surfaces are cordmarked in 12 cases, plain in three, and indeterminate in two. Interior surfaces show evidence of smoothing. Body thickness, perhaps the most distinguishing characteristic of Plains Woodland ware as compared to Plains Village ceramics (see below), ranged from seven to 12 mm with a mean of nine mm.

Plains Village Ware

Complexes of the Plains Village period in the study area and nearby drainages have been assigned to three phases of the Pomona variant (Brown 1985; see chapter 4). These are the Apple Valley phase, centered in the Delaware River basin but also suggested to have extended into the Wakarusa River drainage, and the Clinton and May Brook phases, both of which have been identified in the project area. Ceramics of these phases share a number of characteristics in terms of surface treatments, rim forms, vessel shapes, and temper.

Exterior cordmarking is the most common surface treatment, occurring in about 75% of all sherds from sites in the Wakarusa River drainage examined by Brown (1985:149). Smoothing and floating accounted for the balance of the sherds. The incidence of cordmarking is slightly higher in the Delaware River drainage (83%). Rims include straight, incurvate, and excurvate forms exhibiting, in some cases, collaring or a variety of decorative treatments. Decorative treatment is not characteristic of the Clinton phase; knobbing is a diagnostic of the Apple Valley phase; decoration of the rim, excluding knobbing,

is characteristic of the May Brook phase. Vessel shapes are generally small to medium sized, globular pots rather than the elongate jars so typical of Plains Woodland complexes. In the Central Plains, this reduction in vessel size generally correlates with general thinning of vessel walls, providing a useful significatum for distinguishing samples of Plains Woodland and Plains Village wares (cf. Logan 1981).

Temper includes a variety of materials. However, the most distinctive characteristic of Pomona ware is the frequent absence of any tempering material or the fortuitous dependence on natural inclusions in the paste, such as indurated clay (Witty 1967). Other tempering agents include grit, sand, sherd, and, in some phases, shell (Brown 1985). Because Pomona folk used a variety of tempering materials also employed by earlier Plains Woodland peoples in the same areas but in different frequencies, archaeologists who try to distinguish the ceramic assemblages from sites of both periods must have large samples of sherds. The type of temper itself is not a significatum for either period in the study area. More important is the relative frequencies of certain additives in any particular assemblage.

Plains Village ware in the study area was represented at eight sites and, possibly, at two others (Table 8.2). On the basis of the sample of investigated sites alone, it seems that the study area was more densely populated during this period than the earlier Plains Woodland period. This is not to suggest that the Pomona folk themselves occupied the area in great numbers. It must be noted that our investigations at these Pomona sites resulted in recovery of relatively small ceramic samples suggesting occupations were not prolonged and by small groups. More intense excavations at Pomona sites by the University of Kansas in 1966 yielded ceramic assemblages that, by the standards of nearby regions such as the lower Missouri River in the Kansas City locality, can only be considered meager. For example, major excavation at the Hatcher site yielded a total of 513 sherds (31 rims and 482 body sherds), the largest assemblage from the basin to date. Block excavation of a Pomona variant house structure at the Anderson site resulted in recovery of only 172 sherds (16 rims, 156 body) and a number of these have been described as evidence of a second, Plains Woodland component (Johnson 1968). Other Plains Village sites investigated at the same time yielded smaller quantities of ceramics. Sites 14DO3 produced only 16 sherds (three rims, 13 body); 14DO35 yielded seven body sherds; 14DO41 contained 32 sherds (one rim, 31 body); and 14DO68 had only 39 body sherds. Clearly, only short term occupation of the project area by Pomona folk is indicated.

Very small samples of Pomona ware were found at six sites, 14DO15 (five) 14DO32 (four), 14DO40 (two), 14DO59 (three), 14DO68 (two), and 14DO155 (one). These samples compare favorably to larger assemblages from three other sites, 14DO16, 14DO19, and 14DO39, which will be discussed in greater detail

here. The identifiable ceramic artifacts from 14DO16 consist of one large rim sherd (Fig. 6.) and eight body sherds. The rim sherd is from a vessel which had a mouth diameter of 16 cm. The rim itself is straight, 31 mm in height and four mm thick. The lip, which is rounded, is three mm thick. The angle inflection between rim and body is 126^{o}. The shoulder, at eight mm, is the thickest part of the sherd. The body, which was probably globular in shape, is five mm thick. No form of decoration is present. The exterior surface is brownish yellow and cordmarked with no apparent smoothing. The interior surface is yellow and smoothed over. The core is gray, indicating a carbon streak. There is no apparent slip. The temper is a combination of sand and sherd. In all attributes, the artifact is characteristic of Clinton phase vessels.

The body sherds exhibit some interesting variety in regard to at least one attribute, temper. Four sherds have been tempered with bone, one with sand, one with sand and sherd, one with grit, and one reveals no apparent temper. In one of the bone tempered sherds (Catalog No. DO16860006), a rodent tooth is clearly visible suggesting one possible source of the bone material. We can speculate that the ceramist took advantage of the easily crushed bones of a rodent for a tempering agent. The single sherd tempered with both sand and sherd may belong to the same vessel as the rim sherd. It was found in the same unit and in close proximity to the latter. Unlike the rim sherd, however, this fragment bears traces of a slip of brownish yellow color. The exterior surface color of the sherd is very pale brown and cordmarked, in addition to being slipped. No evidence of smoothing over these surface treatments is visible. The interior surface is yellow in color and has been smoothed over. The core color is dark gray indicating a carbon streak. The remaining sherds are comparable to those described. Body thickness ranges from four mm to seven with a mean of six mm. Not included in this sample is the single grit tempered sherd, which has a body thickness of ten mm. In all other respects, this sherd is similar to the Pomona variant sherds but in regard to both temper and thickness, it shares more attributes with Plains Woodland ware such as that described above. Whether this artifact indicates an earlier component at the site is unclear. Greater samples of such material are required to test this hypothesis.

Sherds from the Hatcher site (14DO19) consist of six body fragments. One is a shoulder sherd and it provides an additional attribute the others cannot provide, that of shoulder thickness. This measurement is seven mm. Body thickness ranges from four to eight mm with a mean of 6.5 mm. Temper is sherd in two cases and absent in four. Exterior surfaces range from pale brown to yellow, are cordmarked in four cases, smoothed over in one, and indeterminate in another. Interior surfaces are predominantly shades of gray and smoothed over. Despite the dark interior color, a carbon streak is discernible in all but two cases. This assemblage does not differ from the Hatcher site ceramics described by Brown (1985) as defini-

tive of the Clinton phase of the Pomona variant.

The largest assemblage of Pomona ware is from 14DO39, a small campsite located within a short distance of the Anderson site (14DO32). The analyzable sample includes two rim and 13 body sherds. One of the rim pieces exhibits a slight collar, has a height of 17 mm and a thickness of six mm (Fig. 6.13e). There is not sufficient arc preserved to determine the diameter of the vessel from which it came. The shoulder thickness is five mm and the lip, which is rounded, is four mm thick. The sherd contains sparse sand temper. Its exterior surface is a light yellowish brown and seems to have been smoothed over. The interior surface is gray and smoothed over. The second rim sherd is straight, 19 mm in height, six mm thick, and presents a flat, thickened (eight mm) lip (Fig. 6.13d). The shoulder is five mm thick. This specimen is unusual in that it contains abundant grains of sand, the largest of which is two mm in size. The exterior surface shows evidence of a dark, grayish brown slip and it has been cordmarked. The interior surface is a very dark gray and has been smoothed over. The core color, which is a lighter shade of gray, indicates no carbon streak.

The body sherds in this assemblage have the following temper types: absent (six), sand (five), and sherd (two). Exterior surfaces are various shades of brown and yellow with four specimens presenting a dark gray aspect. Cordmarking is apparent on these surfaces in six cases and smoothed over in three others. The outside surfaces of two sherds have been too eroded to determine their method of treatment. Interior surfaces are range from very pale brown to dark grayish brown and dark gray. They have, with one exception, been smoothed over. The exception is a rare example of brushing. Body thickness ranges from four to eight mm with a mean of six mm.

Conclusions

The ceramic assemblages recovered during the project are small and, for the most part, do not provide sufficient detail about the ceramic technology of the prehistoric inhabitants of the study area. However, small samples of ceramic materials from sites in the Wakarusa River basin seem to be the rule rather than the exception. It is suggested that this reflects the short term occupations and small size of both Plains Woodland and Plains Village populations. The latter seem to have been present either longer or in greater numbers than the former. Despite the relative brevity of their stays in the study area, the presence of ceramics at their settlements still reflects some degree of sedentism. Highly mobile peoples are not likely to produce such unwieldy vessels as large Plains Woodland jars or fragile containers such as Pomona pots.

While the Plains Woodland occupation at 14SH101 cannot be assigned to any particular phase on the basis of the ceramic artifacts, they are compatible with the Deer Creek phase affiliation suggested by the projectile points (see chapter 7) and

the radiocarbon dates from Feature 1 (see chapter 6).

The Pomona ware from several of the investigated sites cannot be confidently assigned to any particular phase of that variant. However, all attributes of the large rim sherd from 14DO16 fit nicely the ceramic traits of the Clinton phase. Given the fact that this phase was defined on the basis of larger samples of material from the Hatcher site (Brown 1985), it is reasonable to assign this adjacent site to that phase.

Chapter 9

BIOLOGICAL ANALYSES

Mary Adair, Steve Bozarth, Glen Fredlund and Brad Logan

This chapter consists of five sections devoted to analyses of biological materials recovered during the Clinton Lake Archaeological Project. The first three sections describe analyses of botanical remains from two of the more important sites, 14DO19 and 14SH101. In the first section, Mary Adair describes the results of her attempt to identify macrofloral remains in the flotation samples from Feature 1 at 14SH101. Her analysis is important in inferring the function of that feature. In the second section, Glen Fredlund explains his attempt to identify microbotanical remains in a buried depositional horizon at 14SH101. This horizon has been radiocarbon dated to the Wisconsinan period, a time when full glacial conditions prevailed over much of the Central Plains and prehistoric peoples may have been present in the region. His analysis is an attempt to determine the nature of the environment of the area at that time. In the third section, Steve Bozarth describes the types of plants that were used in thatching the habitation structure at the Hatcher site (14DO19) as well as the vegetational environment of the site in general. Bozarth's analysis focuses on opal phytoliths formed by grasses and other plants preserved in the daub recovered in great quantities in Area A at the site. The fourth and fifth sections concern animal and human remains respectively. The editor of this volume describes the small samples of animal remains from 12 sites and a large sample of burned human remains from Feature 1 at 14SH101.

MACROFLORAL ANALYSIS OF FLOTATION SAMPLES FROM A CREMATORIUM AT THE RICHLAND SITE

Mary Adair

Twelve flotation samples, including both light and heavy fractions, were sorted for archaeobotanical remains. Nine of the samples were taken from Feature 1, the three remaining from excavation unit 3. During the sorting of all the samples, wood charcoal, charred and fresh seeds, and nutshell fragments were extracted from the matrix. Specimens within these categories were identified to generic and specific level when possible, using a binocular microscope at 10x-40x, a comparative charred and fresh seed collection, and published seed identification manuals.

Archaeobotanical remains were not well preserved at 14SH101. Table 9.1 lists the identified taxa from all twelve samples. As clearly indicated, fresh seeds dominate the collection with 230 pigweed (*Amaranthus* sp.), 2 goosefoot (*Chenopodium* cf. *berlandieri*), and 42 sorghum or millet seeds. Charred

remains are represented by 13 goosefoot, 4 unidentified seeds, and 33 nutshell fragments, probably black walnut (*Juglans nigra*).

Table 9.1. Identified Taxa, Macrofloral Remains, 14SH101.

Feature 1	Charred	Fresh
Chenopodium cf. *berlandieri* goosefoot	6	1
Amaranthus sp. pigweed		185
Sorghum		3
Juglans nigra black walnut	33	
Unidentified	1	
Excavation Unit 3		
Amaranthus sp.		45
Chenopodium cf. *berlandieri*	7	1
Sorghum		39
Unidentified	3	

The presence of fresh seeds in the flotation samples can be due to several factors, that are not necessarily mutually exclusive. Most seed bearing plants distribute their seeds in late summer to early autumn. Some seeds germinate before winter while others remain dormant, but viable, until spring. During the winter and summer months, the ground expands and contracts with changes in precipitation and temperature, actually allowing small seeds to penetrate deeper into the soil. Plowing can also redistribute fresh seeds as they burrow into the ground. Rodent tunnels have been known to extend several feet below the surface. Fresh seeds can also be present within the water supply used to process the flotation samples and may be trapped within the sample by the fine mesh sieve used to collect the light fraction. This factor is of primary consideration if the flotation is processed in the field during time of normal seed rain.

The fresh seeds within the flotation samples of 14SH101 are therefore not puzzling. Nor are they in large enough quantities to be given any more consideration. Rather, the lack of charred seeds is somewhat surprising. Feature 1 is interpreted as a limestone outlined crematorium. Charred human remains from the feature (see appropriate section below) clearly indicate this function. It is not unreasonable to expect to recover seeds that became accidentally charred when the cremation took place. If viable seeds were present in the soil they

would have been exposed to the heat and reduced to carbon. The presence of a small quantity of goosefoot seeds and walnut shells may be explained by this factor.

The lack of any sizeable quantity of charred seeds in the feature may shed light on such factors as the season of cremation, temperature and duration of the fire, or the possibility that the human remains were redeposited from some other location. If the cremation took place during the late spring or summer, fresh viable seeds in the soil would be at a minimum. Accidental charring would therefore not be extensive. If the temperature of the fire was excessive and of a long duration, plant remains could easily be reduced to total carbon and would probably not survive the recovery process. The badly distorted nutshell remains suggest this factor may be a possibility. The shell fragments are identified as walnut on the basis of their thickness, and in a few cases, a rough exterior surface. All are, however, severly charred and therefore partially distorted.

The suggestion that the feature could consist of redeposited remains does not appear to be a valid argument for the lack of botanical remains. The presence of fired limestone and burned earth (see chapter 6) is strongly indicative of *in situ* burning.

The low quantity of charred plant remains at 14SH101 can therefore most likely be attributed to the function of Feature 1 as a burial, the possibility of interment during periods of no seed rainfall and minimal presence of viable seeds in the soil, and an intense fire that could have disintegrated any botanical remains. While both black walnut (*Juglans nigra*) and goosefoot (*Chenopodium* cf. *berlandieri*) are considered food sources and are frequently recovered from archaeological sites in the Central Plains, their low frequencies at 14SH101 argue that their presence may be due instead to accidental charring.

MICROBOTANICAL ANALYSIS OF A LATE PLEISTOCENE SAMPLE FROM THE RICHLAND SITE

Glen G. Fredlund

Introduction

A single sediment sample from a radiocarbon dated deposit was analyzed for fossil pollen, charcoal, phytoliths, and other siliceous micro-fossils. The sediment sample was selected because of its late Pleistocene radiocarbon date (15,350$\pm$390 B.P.) and its high organic content. This analysis was undertaken for three reasons: 1) to corroborate the radiocarbon date, 2) to help understand the depositional environment of these sediments and 3) to explore the potential for paleoenvironmental reconstruction from the botanical microfossil record at this site.

Laboratory Methodology

A modified heavy-liquid flotation procedure was employed in the concentration of pollen and phytoliths from these subsamples (Johnson and Fredlund 1985; Fredlund 1986). A 20 gm subsample of sediment, analytically weighed, was processed. This procedure consists of five steps: 1) removal of carbonates with hydrochloric acid, 2) dispersal in sodium pyrophosphate (0.1 molar solution) and decantation of soluble organics, colloidal organics, and clays, 3) heavy-liquid fractionation of pollen and other silt-size organic particles from the clastic mineral fraction in zinc bromide (specific gravity up to 2.35), and 4) alchohol dehydration of light, pollen-bearing fractions and storage in silicon fluid (viscosity 2000 c.s., refractive index about 1.45). Phytolith fractions were stored dry and mounted in refractive index oil (viscosity 150 c.s., refractive index about 1.52). Permanent mounted slides of the residues were systematically search using a Leitz photomicroscope. Because pollen concentrations were low, four complete slides were scanned. Phytolith analysis required less than a complete slide. The estimates of pollen concentration were calculated by introducing a known number of exotic spores into each sample during the initial stage of pollen extraction. The ratio of counted spores to introduced spores was then used to estimate the total number of native pollen and spores recovered (Benninghoff 1962).

Results

Although this sample contained an abundance of microscopic charcoal, other plant fragments, opal phytoliths, and diatoms, the primary type of fossil used in paleoenvironmental reconstruction, pollen, was very rare and poorly preserved. The poor preservation of Quaternary pollen is probably due to post-depositional oxidation of the sediment. Because of this absence of pollen, the research objectives cannot be completely reached.

The incomplete microfossil record neither supports nor ques-tions the validity of the radiocarbon date. Other palynological evidence from this region (Gruger 1973; Fredlund and Jaumann 1987) indicate that elements of the boreal forest, including spruce, were displaced at least as far south as central Kansas during the Wisconsinan. The presence of boreal pollen taxa such as *Picea* (spruce) would have corroborated the Pleistocene age of these sediments. Likewise, the occurrence of spruce or pine charcoal in this sample would have suggested Pleistocene vegetation (Wells and Stewart 1987). With the lack of Quaternary pollen data, and the absence of spruce charcoal, the Wisconsinan age of these sediments can neither be confirmed nor denied.

Conversely, there is no indication of significant presence of reworked, pre-Quaternary organics, such as coal dust, in the sediments which could have skewed the radiocarbon assay. If

reworked coal were present, then pre-Quaternary pollen and spores would have also occurred (Nambudiri et al. 1980). Only a single pre-Quaternary spore was identified on the four slides of sample residue. Based on this microscopic analysis there is no reason to believe that the radiocarbon date is incorrect.

The opal phytolith record also tentatively agrees with the hypothesized Pleistocene age and vegetation. The use of opal-phytoliths for paleoenvironmental reconstruction is based on the general conformity of phytolith morphology with climatic adapted subfamilies of grasses (Twiss 1983; Fredlund et al. 1985). All of the phytoliths identified were either "Festucoid", cool-weather adapted grasses types, or non-specific types. This is in concordance with the types of grasses which would have been present in the Wisconsinan.

Other siliceous micro-fossils, including sponge spicules and diatoms, are also present. These microfossils provide some clues to the depositional environment. From the fine particle size and high organic content of these sediments, it was assumed that a slack-water, alluvial depositional situation was probable. The abundance of diatoms and other aquatic fossils supports this hypothesis.

It remains unclear why the pollen preservation is so poor in this sediment. A period of post-depositional oxidation of these sediments is probably the cause (Rolfe Mandel, personal communication). Because of the almost complete absence of pollen, the prospect for further Pleistocene paleoenvironmental research at this site is not encouraging. However, given the disparity of Quaternary paleoenvironmental information in the region (Fredlund and Jaumann 1987), further exploration of this site should be pursued.

OPAL PYTOLITH ANALYSIS OF DAUB SAMPLES FROM THE HATCHER SITE (14DO19)

Steven Bozarth

Abstract

Analysis of phytoliths isolated from a control sample and two modern analogs indicates that the Hatcher site was covered with tall grass prairie at the time of occupation. Analysis of phytoliths from daub demonstrates that Panicoids (tall grass) and Pooids (cool-moist season grass) were the most common grasses used in construction at the site.

Introduction: Background to the Identification of Opal Phytoliths

The word phytolith is derived from the Greek words phyton, meaning plant, and lithos, meaning stone. Phytolith formation begins when dissolved silica in the form of hydrated silica di-

oxide, commonly called opal, is absorbed through a plant's root system and deposited in various cells and cell walls. Phytoliths are formed when this dissolved silica precipitates into solid silica. Only silica bodies produced in plants with characteristic shapes are called opal phytoliths (Wilding and Drees 1971). There are many varied shapes and sizes of phytoliths due to the many different types of cells in any particular plant. Phytoliths are diagnostic when plant cells specific to a particular taxon are silicified.

The monocotyledonous plants, particularly the Graminae, produce a wide variety of morphologically distinctive phytolith forms. These include silicified short cells, elongate cells, bulliform cells, trichomes (prickle-hairs), and stomata. The silicified short, elongate, and bulliform cells are usually well preserved. The trichomes are composed of two parts, an outer sheath and an inner core. The outer sheath dissolves soon after deposition in the soil, but the inner core remains well preserved. The silicified stomata are not well preserved.

Research by Rovner (1971, 1975) indicated that dicotyledonous herbs generally produce irregular, amorphous silica bodies of little taxonomic value. However, more extensive research by Bozarth (1985b) indicates that opaque, perforated, platelets and sculptured, opal spheres with diameters greater than 30 microns are diagnostic of certain species of herbaceous dicots.

Arboreal dicot phytoliths usually consist of fragile, silicified cell walls (Wilding and Drees 1971) that have a rate of dissolution 10-25 times greater than grass phytoliths (Wilding and Drees 1974). Leaves from white oak (Quercus alba), sugar maple (Acer saccahrum), American beech (Fagus grandifolia), American linden (Tilia americana), white ash (Fraxinus americana) and hackberry (Celtis occidentalis) produce opal spheres that range in size from about 50 microns to less than one micron. Most lack surface detail but some have slight indentations or protrusions which are probably the sites of attachment to leaf cells. These opal spheres are apparently produced only by arboreal species and are stable in soil (Wilding and Drees 1973, 1974). Distinctive mushroom shaped phytoliths with bumpy surfaces and stem-like protrusions produced in hackberry (Celtis occidentalis) leaves appear to be diagnostic of hackberry and large phytoliths with bumpy surfaces produced in American elm (Ulmus americana) appear to be unique to elm (Bozarth 1985b). Phytolith analysis of 16 of the more common fruits and nuts native to the Central Plains indicates that large (50-180 microns), grainy phytoliths with reticulate sculpturing and opaque protrusions are diagnostic of hackberry. None of the other fruits and nuts produced identifiable phytoliths (Bozarth 1987b).

Plant opal in conifer needles consists mainly of delicate intercellular silica (Norgren 1972), although all cell types in Pinaceae leaves may be heavily silicified, producing well preserved phytoliths (Klein and Geis 1978). The most distinct

difference between Pinaceae phytoliths and phytoliths in other plants is the presence of tracheids with bordered pit impressions and tapering ends (Klein and Geis 1978). Douglas fir (Pseudotsuga menziesii) needles produce distinctive, silicified asterosclerieds (Brydon et al. 1963; Norgren 1972; Klein and Geis 1978).

Sponge spicules are another form of biogenic silica that are well preserved in soil. Sponge spicules are identified microscop-ically on the presence of an axial canal (Baker 1959; Jones and Beavers 1963). Abundant sponge spicules in soils are indicative of an aquatic habitat favorable for sponge growth (Jones et al. 1964). An abundance of undamaged sponge spicules suggests formation on or near the site (Smithson 1959).

Diatoms are algae (division Chrysophycophyta, class Bacillariosphyceae) that produce siliceous cell walls (Bold 1967). Diatoms occur in both marine and freshwater habitats and in some moist and dry habitats where the light, temperature, and chemical conditions are suitable for their growth (Patrick and Reimer 1966). Diatoms are well preserved in soil.

Analysis of grass phytoliths demonstrates that many short cells are characteristic of certain grass subfamilies (Twiss et al. 1969; Twiss 1978). Saddle shaped phytoliths are produced only in the Chloridoideae subfamily with the one exception that they are also produced in reed grass (Phragmites australis). Bilobate, polylobate, and cross shapped phytoliths are produced in the Panicoideae subfamily and bilobates in the aristida and danthona species of the Chlorideae subfamily; certain types of trapezoidal phytoliths are produced primarily in the Pooideae subfamily (Brown 1984; Mulholland 1984).

The saddle shaped phytoliths, the bilobate, polylobate, and cross shaped phytoliths, and certain types of trapezoidal phytoliths are excellent paleoenvironmental indicators because the three principal prairie types in Kansas are climatically induced (Kuchler 1974). The short-grass prairie occurs in the western part of Kansas where the dominant species are blue grama grass (Bouteloua gracilis) and buffalo grass (Buchloe dactyloides), both Chloridoids (Kuchler 1974). The tallgrass prairie prevails in eastern Kansas where big bluestem (Andropogon gerardi), little bluestem (A. scoparius), Indian grass (Sorghastrum nutans), and switch grass (Panicum virgatum), all Panicoids, are the dominant species (Kuchler 1974). Between them lies the mixed grass prairie with tall, medium tall, and short grasses. The dominant grasses in the mixed prairie are big bluestem, little bluestem, sideoats grama (Bouteloua curtpendula), and blue grama (Kuchler 1974). Of the three types of prairie, the climate is most humid in the tall grass prairie. The Pooideae are adapted to cool and moist climates. Seventy to 85% of grass species of Canada and the northwestern United States are Pooid (Gould and Shaw 1983). The Pooids are also more adapted to woodlands than either Panicoids or Chloridoids (Pohl 1978).

Phytoliths are largely "decay in place" fossils (Rovner 1975). Phytolith analysis can determine if grasslands were growing in a study area and, if so, what type of grassland it was. Grasslands have been reconstructed in Kansas (Bozarth 1986a; Kurmann 1981), Nebraska (Fredlund et al. 1985; Lewis 1978), and other places as well.

Phytolith analysis has also been used to identify cultigens in archaeological sites. Phytolith analysis was first used to identify New World cultigens in Ecuador, where Pearsall (1978) identified maize based on size of cross-shaped phytoliths. Piperno (1984) identified maize in Panama using a more sophisticated and reliable classification method based on size and three dimensional form of cross-shaped phytoliths. In the central United States, maize can be identified based on large (at least 23 microns diameter) ringed trachieds produced in maize cobs (Bozarth 1985a). Maize cobs also produce phytoliths that have concave to straight sides and narrow (at least three times as long as wide) tops and bottoms.. These phytoliths appear to be unique to maize (Bozarth 1986b) and are much more common than the ringed trachieds. Squash can be identified in prehistoric sites based on the presence of spheroidal and hemispheroidal phytoliths with deeply scalloped surfaces of contiguous concavities produced in rinds of certain varieties of squash (Bozarth 1987b). Distinctive silicified multi-celled hair bases are produced in sunflower (Helianthus annuus) disks and appear to be unique to H. annuus (Bozarth 1986c). It is yet to be determined if they can be used to identify domesticated sunflowers (H. annuus. var. macrocarpus). Bean pods produce distinctive hook-shaped phytoliths (Bozarth 1986b) but further research is necessary before it can be determined if they are unique to beans.

Methods

The following samples were collected at the Hatcher site (14DO19) for phytolith analysis: 15 small pieces of daub from a concentration of daub 21-24 cm below surface in Units 7 and 8; soil from the daub concentration 21-24 cm below surface in Unit 8; soil under the daub concentration (presumably the house floor) 25-30 cm below surface in Unit 8; and a control sample 22-29 cm below surface in Unit 5. The control sample was collected below plowzone in level 2 (20-30 cm below surface), which contained no prehistoric artifacts or daub. Two modern analogs were also collected and are discussed below.

Biosilicates were isolated from ten gm soil samples using a modified procedure developed by Rovner (1971) based on heavy-liquid flotation (using zinc bromide mixed to a specific gravity of 2.3) and centrifugation. Phytoliths, sponge spicules, and diatoms were identified using 400x magnification.

Results and Discussion

Phytoliths were analysed based on a random sample of 200 or more bilobate, polylobate, and cross shaped Panicoid type phyto-liths, trapezoidal Pooid phytoliths, and saddle-shaped Chloridoid phytoliths in addition to all other types of phytoliths, diatoms, and sponge spicules isolated from each sample. The percentages of the various phytolith types, diatoms, and sponge spicules are given in Table 9.2.

Analysis of appropriate modern analogs is critical if botanical microfossil data from subsurface samples are to be correctly interpreted. Phytoliths were isolated from a surface sample collected in the Konza prairie (ca. 65 miles west of the Hatcher site) for a modern analog of tallgrass prairie. Phytoliths were isolated from a surface sample collected in the Bridenthal tract (ca. 15 miles east of the Hatcher site) for use as a modern analog of oak-hickory forests in eastern Kansas.

Analysis of the phytolith assemblage from the Bridenthal tract sample demonstrates that grass phytoliths and not arboreal phytoliths are the most common type of phytolith preserved in oak-hickory forests in eastern Kansas. The principal difference between the modern analogs is the presence of 15.9% small, hollow, opal spheres in the oak-hickory analog and the absence of opal spheres in the tallgrass analog. This demonstrates that even a low percentage (ca. 15%) of opal spheres in a phytolith assemblage that is mostly (85%) grass phytoliths could indicate an oak-hickory forest. The dominance of Pooid phytoliths in the oak-hickory analog compared to the tallgrass analog (Fig. 9.1) reflects the fact that more Pooids are adapted to woodlands than the Panicoids. Analysis of the phytoliths isolated from the Konza prairie surface sample demonstrates that elongate phytoliths are by far the most common type of phytolith in the tallgrass prairie. However, the surface of most of the elongate phytoliths were deeply pitted, indicating that fossil tallgrass phytolith assemblages might contain significantly lower percentages of elongate phytoliths. Phytoliths characteristic of Panicoids, Pooids, and Chloridoids were generally well preserved.

Based on the above analysis of the modern analogs, the Hatcher site was covered with tallgrass prairie at the time of occupation, since the phytolith assemblage from the control sample consists of 99.7% grass phytoliths. The relatively high percentage of Pooid phytoliths probably reflects the microenvironment created by a large slough that divides the site (see chapter 6, Fig. 6.4). The single opal sphere (.3%) in the control sample phytolith assemblage may have been produced in trees growing immediately adjacent to Rock Creek. The lower percentage of elongate phytoliths in the control sample compared to the tallgrass modern analog is probably due to poor preservation. More samples would have to be analyzed in order to verify this.

TABLE 9.2 NUMBER AND PERCENTAGE OF BIOSILICATES
FROM THE HATCHER STIE (14DO19) AND MODERN ANALOGS

	Pan	Pooid	Chlor	Elong	R	B	T	S	SS	D	Total
Daub	97	94	21	65	23	4	8	4	1		317
XU 7 & 8	30.6	29.6	6.6	20.5	7.3	1.3	2.5	1.3	.3		
21-24 cm B.S.											
Daub matrix	56	110	52	86	15	9	5	2	1		336
XU 7 & 8	16.6	32.7	15.5	25.6	4.5	2.7	1.5	.6	.3		
21-24 cm B.S.											
Floor	65	88	48	85	14	12	1	2			315
XU 8	20.6	28.0	15.2	27.0	4.5	3.8	.3	.6			
25-30 cm B.S.											
Control	61	95	50	92	15	10	8	1			332
XU 5	18.4	28.6	15.1	27.7	4.5	3.0	2.4	.3			
22-29 cm B.S.											
Tall grass	83	71	58	407	6	34	18			3	680
Prairie	12.2	10.4	8.5	60.0	.9	5.0	2.6			.4	
Oak hickory	57	105	49	18	12	2		46		1	290
forest	19.7	36.2	16.9	6.2	4.1	.7		15.9		.3	

Key:

Pan	:Panicoid
Pooid	:Pooid
Chlor	:Chloridoid
Elong	:Elongate
R	:Rods
B	:Bulliform
T	:Trichome
S	:Spheres
SS	:Sponge spicules
D	:Diatoms

Note: top line is number of biosilicates and bottom line is percentage of biosilicates.

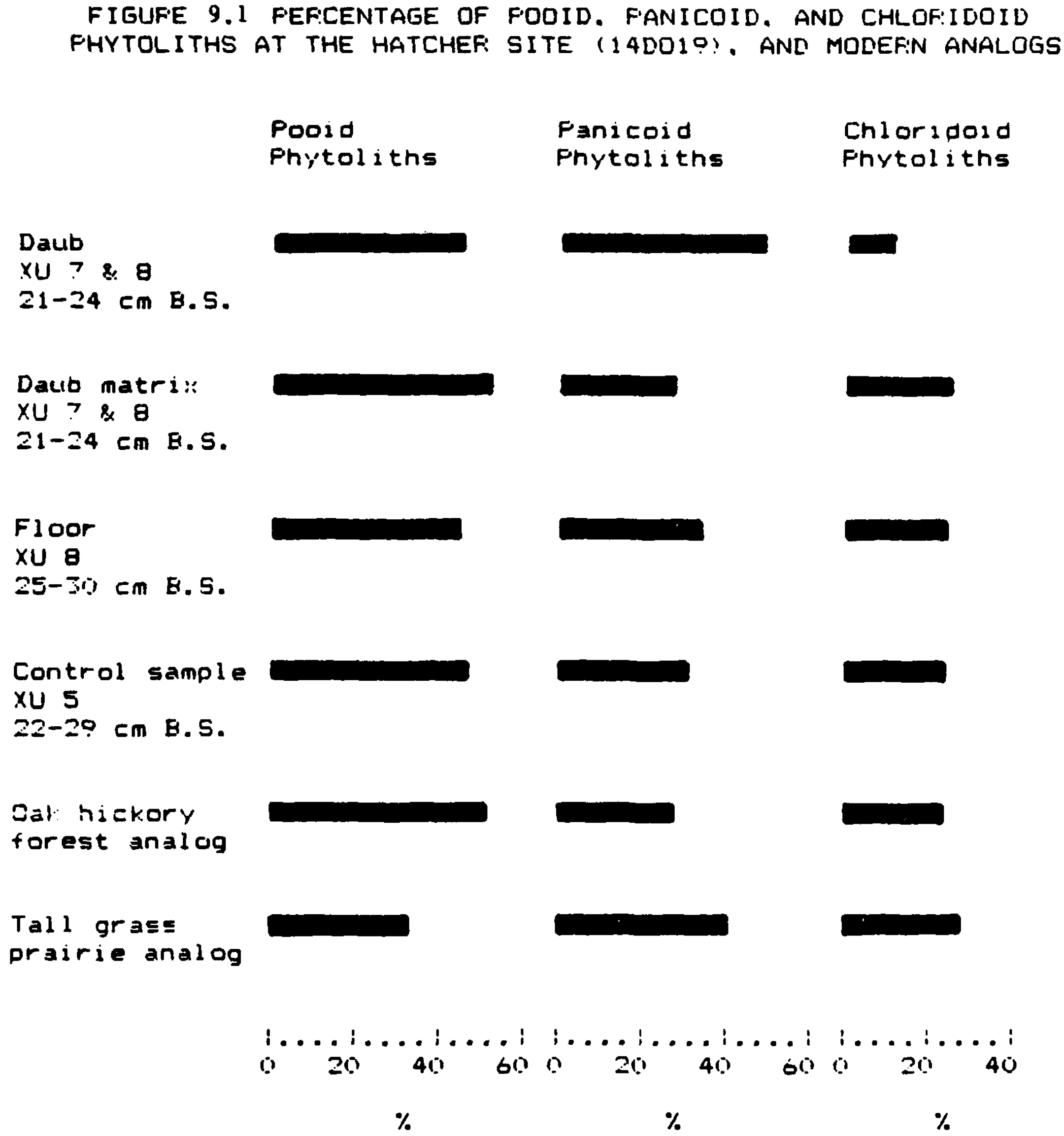


Figure 9.1. Relative frequencies of opal phytolith types from daub samples (14DO19) and controls

Phytoliths were isolated from 15 pieces of daub which were very hard with well preserved grass impressions demonstrating that the sediment used in lodge construction had a very high clay content. Significant amounts of phytoliths would not have been in the clay when it was collected since the clay would have formed below surface by illuviation or weathering of shale and thus would not have supported any vegetation. Since phytolith illuviation is not a significant factor in silts and clays (Piperno 1984), most of the phytoliths from the daub are from grass used in the construction of the structure. The percentage of silica cells from the daub (46% Panicoid, 44% Pooid, and 10% Chloridoid phytoliths) shows that Panicoids and Pooids were the most common grasses used in construction at the Hatcher site. The Chloridoid phytoliths may be from slough grass (Spartina pectinata), which was one of the dominant grasses in the tallgrass prairie and grows well in wet ground (Pohl 1978; Tomanek 1963). Its height (six to ten feet) would have made it desirable for use in construction and the proximity of the slough to the structure would have made it easily obtainable.

The presence of 4 (1.3%) opal spheres in the daub compared to only 1 (.3%) opal sphere in the control sample indicates the clay was dug from the bank of nearby Rock Creek where trees would have been growing and depositing opal spheres on the creek bank. The presence of one (.3%) sponge spicule in the daub and the daub matrix compared to the absence of sponge spicules in floor and control samples is further support that the clay was dug from the bank of Rock Creek since the river bank would have been a favorable habitat for sponge growth.

More than 10,000 phytoliths from the floor sample were scanned using 400x magnification. No cultigen phytoliths were found. This does not mean that cultigens were not at the site since cultigen remains could easily be in areas not sampled.

ANALYSIS OF FAUNAL REMAINS FROM TWELVE SITES IN THE CLINTON LAKE PROJECT AREA

Brad Logan

The animal remains recovered during the Clinton Lake project consist of very small amounts of bone that are generally very poorly preserved and a few fragments of gastropod shells that probably represent recent intrusions (Table 9.3). Only twelve of the 26 tested sites are represented in this analysis and only one of these, the Hatcher site, contained relatively well preserved bone elements.

The scarcity of animal remains at archaeological sites in the Clinton Lake area is not surprising. Despite survey and excavation efforts at 11 sites, including intensive mitigation of three sites, in the project area by the University of Kansas in 1966, only 128 bone elements from five sites were identified

Table 9.3. Faunal Remains from 12 Sites in the Clinton Lake Project Area.

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO15	4	1 (0-20)	DO15860256	tooth enamel fragment- cervid?
14DO16	1	2 (10-20)	DO16860042	vertebral fragment- snake?
14DO16	1	2 (10-20)	DO16860043	long bone fragment- med. mammal
14DO16	1	2 (10-20)	DO16860044	unident. bone
14DO16	1	3 (20-30)	DO16860067	scapula fragment- small mammal
14DO16	6	2 (10-20)	DO16860224- DO16860225	2 gastropod shell fragments
14DO16	6	3 (20-30)	DO16860243	unident. bone
14DO19	6	1 (0-20)	DO19860807	cervid tooth frag
14DO19	7	1 (0-20)	DO19864455- DO19864462	8 pieces of unidentifiable bone
14DO19	8	2 (20-30)	DO19868046- DO19868047	two burned bone- unidentifiable
14DO19	8	2 (20-30)	DO19868045	burned, striated bone- unident.
14DO19	9	1 (0-30)	DO19869094	long bone frag. medium mammal
14DO19	9	2 (30-40)	DO19869095- DO19869097	3 long bone frag deer size
14DO19	9	2 (30-40)	DO19869098- DO19869099	2 unidentifiable bone fragments
14DO19	9	2 (30-40)	DO19869100	proximal humerus small mammal
14DO19	9	3 (40-50)	DO19869101- DO19869103	3 long bone frag medium mammal
14DO19	9	3 (40-50)	DO19869104	sesamoid- deer?
14DO19	9	3 (40-50)	DO19869105	anter. mandible small mammal
14DO19	9	3 (40-50)	DO19869106- DO19869107	2 unidentifiable bone fragments
14DO19	10	1 (0-20)	DO19869109	eroded podial- deer-size
14DO19	10	2 (20-30)	DO19869110	cranial frag.? deer-size
14DO19	11	1 (0-20)	DO19869114- DO19869118	4 unidentifiable bone fragments
14DO19	11	2 (20-30)	DO19869123- DO19869125	3 unidentifiable bone med. mammal
14DO19	11	3 (30-40)	DO19869128	unidentifiable bone med. mammal
14DO19	11	4 (40-50)	DO19869135	right post. mandible sm. mammal
14DO19	12	1 (0-24)	DO19869138- DO19869141	4 unidentifiable bone med. mammal

Table 9.3. (cont')

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO19	12	1 (0-24)	DO19869142	left calcaneum, Ondatra zibethicus
14DO19	12	2 (24-34)	DO19869150	unident. bone
14DO19	Trench 3	80 cm bs	DO19869162	2 burned bone, unidentifiable
14DO19	Trench 3	80 cm bs	DO19869163	occipital frag. Odocoileus virginianus
14DO19	Trench 5	71 cm bs	DO19869158	ant. frag. metatarsal shaft with green bone break- cf. Odocoileus
14DO32	1	1 (0-10)	DO32860081	unident. bone
14DO35	4	1 (0-30)	DO35861381-DO35861383	3 gastropod shell fragments
14DO35	10	1 (0-20)	DO35864048	unident. bone
14DO40	1	1 (0-20)	DO40860034-DO40860037	4 unidentifiable bone fragments
14DO61	4	1 (0-10)	DO61860027	gastropod
14DO62	1	1 (0-20)	DO62860074	turtle carapace-peripheral
14DO62	1	1 (0-20)	DO62860075	unident. burned bone fragment
14DO62	3	1 (0-20)	DO62860201	unident.bone frag med.-large mammal
14DO68	1	2 (20-30)	DO68860042	unident. burned bone fragment
14DO68	2	1 (0-20)	DO68860089	unident. bone
14DO68	4	1 (0-20)	DO68860151	unident. bone-large mammal
14DO68	4	2 (20-30)	DO68860165-DO68860168	4 unidentifiable bone fragments
14DO75	2	2 (20-30)	DO75860010	unident. bone
14DO309	7	1 (0-10)	DO309860234	gastropod frag.
14DO309	7	4 (30-40)	DO309860268	gastropod frag.
14DO309	8	1 (0-10)	DO309860279-DO309860281	3 gastropod shell fragments
14DO309	9	1 (0-10)	DO309860321	large gastropod
14DO309	9	2 (10-20)	DO309860323	gastropod frag.
14DO309	11	1 (0-10)	DO309860334-DO309860336	3 gastropod shell fragments
14SH101	3	2 (20-30)	SH101862411	burned, striated long bone shaft frag.- rabbit or large bird size
14SH101	Feature 1	1 (20-30)	SH101864033	burned fish vert.
14SH101	Feature 1	1 (20-30)	SH101864034	unident. bone
14SH101	Feature 1	1 (20-30)	SH101864255	burned fish vert.

Table 9.3. (cont')

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14SH101	Feature 1	1 (20-30)	SH101864256	unburned fish vertebra
14SH101	Feature 1	1 (20-30)	SH101864647	fish vertebra
14SH101	Feature 1	1 (20-30)	SH101865889	unident., burned bone fragment- sm. mammal/bird
14SH101	Feature 1	2 (30-37)	SH101865658	insect exoskeleton fragments
14SH101	Feature 1	2 (30-37)	SH101865730	fish bone frag.

small mammal: rodent size medium mammal: canid size medium-large mammal: deer size large mammal: elk or bison size

(Gilbert 1968). According to Gilbert (1968:138), "a shoe box would easily hold all of the animal bones from even the most productive site". The Kampshroeder site (14DO27), now under Clinton Lake, produced five elements of bison, thirteen of deer, one of coyote, and one turtle bone. The Anderson site (14DO32), surprisingly, produced no identifiable bone in spite of the presence of the remains of a house structure and its associated features. The Stull site (14DO35) contained only three elements of bison and one bone of a cottontail rabbit. (Our excavations at these last two sites also resulted in the recovery of very few animal remains.) A total of ten bison bones, 47 deer bones, and a single beaver bone was found at 14DO4, a site now inundated by Clinton Lake. Twenty-eight elements of bison, six of deer, four of raccoon, two of pocket gopher, and one turtle element were found at the Hatcher site (Gilbert 1968).

Test excavations at 19 sites in the project area in 1978-1979 by Iroquois Research Institute similarly resulted in the discovery of very few animal remains. Only eight mussel shells were recovered at 14DO134; one unmodified turtle shell was found at 14DO137; three unmodified turtle shell fragments were found at 14DO140; and a single cervical vertebra of a bison was recovered at 14DO144, albiet at a depth of 79-91 cm below surface (and without any associated cultural material) (Nathan 1980:93, 102, 108, 113-114, 117). Preservation of the bison bone at this last site was attributed to "its relative depth and the acidity of the soil being a neutral pH 7" (Nathan 1980:114).

For many years it has been suggested that acidity of the soils in northeastern Kansas and northwestern Missouri may account for the scarcity of animal remains at some sites (e.g., Wedel 1943:73). However, it has also been noted that bone preservation in the midwestern region of the United States also

correlates with the amount of soil phosphorus present at certain depths. Artz (1983b) suggests that the depletion of phosphorus in soils between 30-60 cm in depth, caused by its uptake by plant roots, results in greater chemical weathering of bone in that zone. This zone may extend to depths as great as one meter. However, at increasingly greater depths the amount of soil phosphorus increases and acts as a buffer to bone weathering. Since many sites investigated in the Clinton Lake area consisted of shallow cultural deposits, a factor such as this may explain why so little bone was recovered. Consequently, the faunal assemblages from most of the sites cannot be described in sufficient detail to provide any environmental, seasonal, or subsistence information. One exception is the small collection of bone from the Hatcher site (14DO19; Table 9.3).

Only a few pieces of unidentifiable bone, some of them burned, were recovered from three of the four test units in Area A at the Hatcher site. These units also contained large amounts of daub. Since burned pieces of bone were found in association with this material below the plow zone in Unit 8, we may assume they were burned at the same time as the house structure of which the daub was part.

Small quantities of animal bone were found in all levels and all test units in Area C at the Hatcher site. Unfortunately, most of this material was either very fragmentary or poorly preserved and could not be identified to the genus level. A few rodent-size elements probably represent animals that were intrusive in the archaeological deposits. One interesting element is the calcaneus of a muskrat, an aquatic animal rarely seen far from its water habitat (Bee et al. 1981:148-149). The presence of this animal over 40 meters from the nearest source of water (Rock Creek) may be attributable to its predation by humans or a carnivore, such as coyote. Most of the bones in Area C are probably remains of deer. These include the occipital portion of a skull discovered at a depth of 80 cm in one of the walls of Trench 3 (Fig. 6.2f). Although found in a rather eroding state, the cranial fragments were easily reconstructed. They were noted in close proximity to flake tools and a few small pieces of unidentifiable burned bone (see chapter 6). Although no butchering marks are visible on the skull, it seems clear from its stratigraphic context in association with cultural materials that the animal was hunted by the occupants of the site. Another fragment of deer bone, from the anterior of a metatarsal shaft, was recovered in Trench 5 at a depth of 71 cm. This fragment exhibits the fracture pattern characteristic of breakage in the fresh, or "green", state. It is suggested that this bone is also evidence of deer procurement at the site and its comparable depth indicates a buried component not only in Area C, but in the relatively unexplored area to the north, across an erosional swale.

Other animal remains of interest were found at 14SH101 in

association with human remains in Feature 1 (see following section). Among these is a small piece of worked bone identifiable only as rabbit or large bird size. It exhibits a high gloss, per-haps attributable to burning or to an earlier stage of polishing, and several parallel lines or striations (Fig. 6.36m). Four small fish vertebra were found in the feature, all but one of them burned. Their presence is indicative of the procurement of fish by the site's inhabitants, although such animals were apparently not of great importance in their subsistence practices. Certainly, we require greater samples of material in order to measure the degree of dependence on such resources. Along these lines, it is important to note that these small bones would not have been recovered by conventional screening techniques. Only flotation of all fill from the feature and careful sorting of the resulting light fractions led to their discovery. Future archaeologists interested in the food economy of the prehistoric inhabitants of the Wakarusa River basin will want to apply the flotation technique more frequently than is possible during a testing program. Moreover, archaeologists should also apply soil chemistry tests at sites in the project area in order to determine whether such chemical factors as acidity or phosphorus content account for the noticeable scarcity of animal remains.

HUMAN REMAINS FROM THE RICHLAND CREMATORIUM: ANALYSIS AND INTERPRETATION OF WOODLAND MORTUARY PRACTICES

Brad Logan

Introduction

All human remains recovered during the Clinton Lake Archaeological Project derive from Feature 1 at 14SH101 (see the description of the site in chapter 6). This feature consisted of a concentration of burned limestone and associated bone, teeth fragments, lithics, charcoal and burned earth. Considering the paucity of plant and identified animal remains (see above sections of this chapter) and the small sample of lithic artifacts from the feature in comparison to the abundance of burned limestone and human remains, its identification as a crematorium is appropriate. Table 9.4 presents data on the human remains from Feature 1 (as well as the surrounding matrix in Units 2 and 3) in terms of counts and weights. Table 9.5 is a list of this material. Although many of the small pieces of burned bone and teeth could not be identified, it is assumed all of them are human. This assumption stems from the fact that the vast majority of identifiable bone and teeth from the feature is human. The following discussion addresses the condition of the bone material, the representation of certain elements and minimum number of individuals present, the age and sex of individuals, and the mortuary practices of the site occupants as compared to those of their regional contemporaries.

Table 9.4. Distribution and Quantities of Burned Human Bone in Feature 1 and Surrounding Matrix at 14SH101.

Unit No.	Level (cm)	Quantity	Weight (gms.)
2	1 (0-20)	14	3.5
2	2 (20-30)	5	3.0
3	1 (0-20)	34	17.0
3	2 (20-30)	466	237.0
3	2 (20-30)	uncounted*	24.5
Feature 1	General	21	65.0
Feature 1	1 (20-30)	699	405.5
Feature 1	1 (20-30)	uncounted *	84.0
Feature 1	2 (30-37)	412	199.0
Feature 1	2 (30-37)	uncounted *	70.0
Totals		1,651	930.0
		uncounted *	178.5

*flotation sample bone material, sorted but not counted

Table 9.5. Human Remains from Feature 1 and Surrounding Matrix at 14SH101.

Unit No.	Level (cm)	Catalog No.[1]	Description[2]
2	1 (0-20)	1184-1197	1 cranial fragment-C 13 unident. bone-C
2	2 (20-30)	1300	vertebral fragment-C
2	2 (20-30)	1301-1304	4 post-cranial fragments-C
3	1 (0-20)	1784, 1786	2 cranial frags.-C
3	1 (0-20)	1779-1783, 1785, 1787	7 post-cranial fragments-C
3	1 (0-20)	1788-1812	25 post-cranial fragments-C
3	2 (20-30)	2416	parietal or frontal frag. along coronal suture-BR
3	2 (20-30)	2418	left mastoid-B
3	2 (20-30)	2419-2421	left and right parietal fragment at sagittal suture-B/BR
3	2 (20-30)	2422-2423	left parietal frag.? at sagittal/coronal suture-B/BR
3	2 (20-30)	2412, 2414-2415 2417, 2424-2428	9 cranial fragments 6-C, 3-B
3	2 (20-30)	2429-2435	7 unident. bone; 6-C, 1-BU/BR
3	2 (20-30)	2436, 2438, 2439	3 tooth frags

Table 9.5. (cont')

Unit No.	Level (cm)	Catalog No.[1]	Description
3	2 (20-30)	2437	P^4, heavy wear-adult
3	2 (20-30)	2440	M_3 root-B
3	2 (20-30)	2441-2487	47 post-cranial frag 27-C, 7-BU, 7-B, 6-BR
3	2 (20-30)	2488-2689	202 post-cranial fragments
3*	2 (20-30)	5805	9 tooth frags.-B
3	2 (20-30)	5806	vertebral fragment-C
3	2 (20-30)	5807-5810, 5812	5 cranial- 3-B, 2-BU
3	2 (20-30)	5811	vertebral fragment-C
3	2 (20-30)	5813-5822, 5824	11 post-cranial- 7-C 2-BU, 2-BR
3	2 (20-30)	5823	cranial (frontal-near orbit?)-BR
3	2 (20-30)	5824-5887	63 unident. frags.
3	2 (20-30)	5888	uncounted 1/4" sieve residue, unident.
3	2 (20-30)	5978	tooth crown (pre-molar?)- BU
3	2 (20-30)	5979	left M_3- heavy wear (old adult?), 4 fragments-BR
3	2 (20-30)	5980	prob. distal end of foot phalanx-C
3	2 (20-30)	5981	distal end of phalanx-BR/BU
3	2 (20-30)	5982	metapodial frag-BU/C
3	2 (20-30)	5983	post-cranial-BR
3	2 (20-30)	5984-5994	11 post-cranial- 5-C 6-BR/B
3	2 (20-30)	5995-6044	50 post-cranial- 25-C, 15-BR, 5-B
3	2 (20-30)	6045	uncounted 1/4" sieve residue, unident.
3	2 (20-30)	6046	finger/toenail frag?
3	2 (20-30)	6056	cranial fragment?-C
3	2 (20-30)	6057	humerus or femur head fragment-B
3	2 (20-30)	6058-6062	5 unident. frags.
Feature 1	General	3480-3490, 3564 3574-3575, 3577 3653-3655, 3657-3658, 5086, 5088-5089	cranium- occipital and portions of left right parietals-adult, possibly male-C
Feature 1	1 (20-30)	3501	left zygomatic (lateral orbit wall)-BR
Feature 1	1 (20-30)	3502-3504	3 cranial fragments 1-C, 2-BU/BR

Table 9.5. (cont')

Unit No.	Level (cm)	Catalog No.[1]	Description[2]
Feature 1	1 (20-30)	3491-3500	10 frags-right frontal at eye orbit-C/BU/BR
Feature 1	1 (20-30)	3505-3507	3 frags-anterior of tibia shaft-C
Feature 1	1 (20-30)	3511-3514	4 frags-humerus head -C
Feature 1	1 (20-30)	3519	proximal metatarsal #3-BU/BR
Feature 1	1 (20-30)	3520	Superior pubic ramus fragment-C
Feature 1	1 (20-30)	3521	clavicle fragment-C
Feature 1	1 (20-30)	3532	last sacral or first coccyx vertebra-C
Feature 1	1 (20-30)	3530	metapodial frag.-C
Feature 1	1 (20-30)	3508-3510	3 long bone shaft fragments-BU/BR
Feature 1	1 (20-30)	3515-3518	4 long bone shaft fragments-B
Feature 1	1 (20-30)	3522-3529, 3531	9 post-cranial-C
Feature 1	1 (20-30)	3533-3563	31 post-cranial-C
Feature 1	1 (20-30)	3567-3570	4 cranial vault-C
Feature 1	1 (20-30)	3571-3572	2 cranial vault-C
Feature 1	1 (20-30)	3573	parietal fragment-at coronal-sagittal juncture?-C/BU
Feature 1	1 (20-30)	3576, 3578-3579	3 cranial-C
Feature 1	1 (20-30)	3580-3585	6 cranial-C
Feature 1	1 (20-30)	3594	metapodial frag-BU/BR
Feature 1	1 (20-30)	3593	distal femur frag?-C
Feature 1	1 (20-30)	3586-3592, 3596-3602	15 post-cranial fragments-C
Feature 1	1 (20-30)	3603-3625	23 post-cranial-C
Feature 1	1 (20-30)	3626-3628	3 cranial; 2-C/BU, 1 BU/BR
Feature 1	1 (20-30)	3629-3638	10 post-cranial-C
Feature 1	1 (20-30)	3639-3652	14 post-cranial-C
Feature 1	1 (20-30)	3675-3677	3 cranial-C
Feature 1	1 (20-30)	3656	right occipital frag near temporal-BU/B
Feature 1	1 (20-30)	3659	left parietal-C/BU/B
Feature 1	1 (20-30)	3660, 2413	parietal squama-BU/BR
Feature 1	1 (20-30)	3664	frontal above orbits on vault?-C/BU
Feature 1	1 (20-30)	3665	occipital fragment, midline near foramen magnum-BU/BR
Feature 1	1 (20-30)	3666	right posterior petrosal wall of temporal-C

Table 9.5. (cont')

Unit No.	Level (cm)	Catalog No.[1]	Description[2]
Feature 1	1 (20-30)	3668	left zygomatic arch-C/BU
Feature 1	1 (20-30)	3669	prob. sphenoid-C
Feature 1	1 (20-30)	3671-3672	prob. right frontal-B
Feature 1	1 (20-30)	3673-3674	left parietal along temporal squama-BU/BR
Feature 1	1 (20-30)	3661-3663, 3667,	4 cranial fragments-
Feature 1	1 (20-30)	3773	distal phalanx-C
Feature 1	1 (20-30)	3678-3773	96 post-cranial- 4-B 63-C, 21-BU, 8-BR
Feature 1	1 (20-30)	3774-3811	38 post-cranial
Feature 1	1 (20-30)	3948	upper premolar root-C/B
Feature 1	1 (20-30)	3949-3950	2 tooth frags.-C
Feature 1	1 (20-30)	3951-3956	6 cranial frags.- 2-C, 3-BU, 1-B
Feature 1	1 (20-30)	3957-3968	12 post-cranial- 4-C, 2-BU, 6-BR
Feature 1	1 (20-30)	3969	distal phalanx-BR
Feature 1	1 (20-30)	3970-4031	62 unident. bone
Feature 1	1 (20-30)	4032	uncounted 1/4" sieve residue, unident.
Feature 1	1 (20-30)	4138	cranial vault-B
Feature 1	1 (20-30)	4139-4154	16 post-cranial frag 2-C, 3-BU, 3-BR, 8-B
Feature 1	1 (20-30)	4155-4253	99 unident. bone, 1/4" sieve residue
Feature 1	1 (20-30)	4254	uncounted 1/4" sieve residue, unident.
Feature 1	1 (20-30)	4488	lower molar root and crown frag?-BU/BR
Feature 1	1 (20-30)	4489	occipital fragment, along the midline-B
Feature 1	1 (20-30)	4490-4493	4 cranial- 1-BU, 2-BR, 1-B
Feature 1	1 (20-30)	4494-4511	18 post-cranial- 8-C 1-BU, 5-BR, 4-B
Feature 1	1 (20-30)	4512-4645	134 unident. bone, 1/4" sieve residue
Feature 1	1 (20-30)	4646	uncounted 1/4" sieve residue, unident.
Feature 1	1 (20-30)	4834	cranial fragment-BR
Feature 1	1 (20-30)	4835-4844	10 post-cranial fragments- 9-C, 1-B
Feature 1	1 (20-30)	4845	uncounted 1/4" sieve residue, unident.
Feature 1	1 (20-30)	4935-4949	15 post-cranial frag 9-C, 2-BR, 4-B

Table 9.5. (cont')

Unit No.	Level (cm)	Catalog No.[1]	Description[2]
Feature 1	1 (20-30)	4950	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5090-5092	frontal at midline- BU exterior/B inter.
Feature 1	2 (30-37)	5093-5096	4 cranial- 3-C, 1-B inter/C exter vault
Feature 1	2 (30-37)	5097	right temporal (at temporal-mastoid junction)-C
Feature 1	2 (30-37)	5098	frontal fragment, left of midline-B
Feature 1	2 (30-37)	5099-5102	4 cranial- 2-C, 2 BU
Feature 1	2 (30-37)	5103	incisor crown frag-C
Feature 1	2 (30-37)	5104-5147	44 post-cranial- 24C 8-BU/BR, 4-B
Feature 1	2 (30-37)	5148-5244	97 unident. frags.
Feature 1	2 (30-37)	5245-5247	3 cranial- 2-C, 1-BU/BR
Feature 1	2 (30-37)	5248-5253	6 cranial-C
Feature 1	2 (30-37)	5254-5260, 5262 5264, 5267, 5269-5279	18 post-cranial- 11C 3-BU, 4BR/B
Feature 1	2 (30-37)	5261	prox. right ulna-C
Feature 1	2 (30-37)	5263	ulnar or fibular shaft- BU/BR
Feature 1	2 (30-37)	5265, 5268	vertebral arch-C
Feature 1	2 (30-37)	5280-5320	41 post-cranial-C
Feature 1	2 (30-37)	5363-5364	2 cranial vault-C/BU (frontal or occipital midline)
Feature 1	2 (30-37)	5365-5367	3 post-cranial-C
Feature 1	2 (30-37)	5368-5373	6 unident. bone- 3C, 2-BU, 1B
Feature 1	2 (30-37)	5374	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5424	canine root?-B
Feature 1	2 (30-37)	5425	podial fragment-BR
Feature 1	2 (30-37)	5426-5435	10 unident. frags- 5-C, 4-BU/BR, 1-B
Feature 1	2 (30-37)	5436-5450	15 unident. frags- 7-C, 3-BU, 3-BR, 2-B
Feature 1	2 (30-37)	5451	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5540	tooth fragment-C
Feature 1	2 (30-37)	5541	14 tooth frags, one molar crown with heavy wear-B
Feature 1	2 (30-37)	5542-5545	4 cranial- 2-C, 2-B
Feature 1	2 (30-37)	5546-5547	2 vertebral process fragments-C

Table 9.5. (cont')

Unit No.	Level (cm)	Catalog No.[1]	Description[2]
Feature 1	2 (30-37)	5548-5567, 5569-5572	24 post-cranial- 11-C 3-BU, 7-BR, 3-B
Feature 1	2 (30-37)	5568	prox. metatarsal-BR
Feature 1	2 (30-37)	5573-5616	44 unident. frags.
Feature 1	2 (30-37)	5617	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5639	5 tooth frags- 4B, 1-C
Feature 1	2 (30-37)	5640	distal phalange- BR
Feature 1	2 (30-37)	5641-5645	5 post-cranial- 3-BU 1-BR, 1-B
Feature 1	2 (30-37)	5646-5656	11 unident. frags.
Feature 1	2 (30-37)	5657	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5693-5696	4 cranial- 3-C, 1-BR/B (vault frag.)
Feature 1	2 (30-37)	5697-5708	12 post-cranial- 8-C/BU, 4-B
Feature 1	2 (30-37)	5709-5727	19 unident. frags.
Feature 1	2 (30-37)	5728	7 tooth frags.-B
Feature 1	2 (30-37)	5729	uncounted 1/4" sieve residue, unident.
Feature 1	2 (30-37)	5741	tooth root fragment-BU/BR
Feature 1	2 (30-37)	5742	cranial vault frag.-BU/BR
Feature 1	2 (30-37)	5743-5754	12 unident. frags.-7-C, 2-BU, 3-B
Feature 1	2 (30-37)	5755	uncounted 1/4" sieve residue, unident.

[1]all catalog numbers prefixed by SH10186
[2]C= calcined (gray/white); BU= blue; BR= brown; B= black
*This and all subsequent Unit 3 remains were recovered from above and around Feature 1.

Condition of Bone

Experiments in cremation of bone by Baby (1954) have demonstrated that color differences reflect the degree or extent of burning. Completely incinerated bone grades in this regard from blue to gray and, ultimately, to white. Bones that have not been exposed to temperatures greater than 800°C. are only scorched or blackened (Ubelaker 1978:34). Experiments in cremating dry and "green" (i.e., bone with the flesh adhering) bone by Baby (1954) and Binford (1963) have also demonstrated that material in these states react differently to fire.

Cremated dry bone exhibits superficial checking, longitudinal fracturing or splintering without warping. Bone burned "in the flesh", however, exhibits marked warping and distortion, long bones reveal deep longitudinal and transverse fracturing and endosteum is occasionally identifiable.

Nearly all of the bone from the feature and its surrounding matrix exhibited some degree of the effects of burning. Most of the larger fragments (n=606) are completely or partially calcined, as reflected by their gray/white or blue color (Figs. 9.2 and 9.3). Only 182 fragments were fired to a brown or black color, characteristic of incomplete cremation (36 fragments exhibited a combination of calcined and uncalcined colors). While some cranial fragments exhibit blackening and lack of distortion, the majority are calcined and warped. The best example of this condition is a reconstructed occipital (Fig. 9.2). The cremation resulted in a high degree of fragmentation of elements; no single element is complete. The largest unreconstructed fragment (Fig. 9.4a) is only 7x4 cm and is not typical of the size of others in the assemblage. The degree of extreme fragmentation is revealed by the hundreds of small pieces of bone recovered from flotation of the feature fill. No evidence of intentional dismemberment, in the form of butchering marks, was noted on any of the bone.

Representation of Elements and Individuals

Fragments of bones from both axial and appendicular portions of the body are present in varying degrees of incineration. No meaningful pattern in burning vis-a-vis body part is discernible. As mentioned above, some cranial pieces are completely calcined and others only blackened. Some limb bones, such as a portion of a tibia shaft, a humerus head (Fig. 9.3e) and a few phalanges (e.g., Fig. 9.5a, g), are incinerated but fragments of foot bones (e.g., Fig. 9.5m-n) are not. The few identifiable pieces of vertebrae are all calcined. Teeth, without exception, have not been preserved intact, probably due to the fact that intense heat causes moisture in the dentine to boil and shatter the teeth (Dr. Jerome C. Rose, personal communication, 1987; cf. Brothwell 1981:16). It has been suggested that this characteristic of the dental remains also indicates cremation shortly after the time of death (Dr. Jerome C. Rose, Department of Anthropology, University of Arkansas, personal communication, 1987).

Binford (1972:385) has suggested that the fully calcined and leached remains of an adult male would result in about 1,750 gms of bone. At total of 1,108.5 gms of bone was recovered from the excavated portion of Feature 1 (Table 9.4; recall [chapter 6], a portion of the feature of unknown extent remains unexcavated). This total would represent about 63% of a single such individual. However, despite the highly fragmented state of the remains, we can be certain that at least two individuals are represented. The fact that some frontal, parietal, and mastoid portions of a skull (or skulls) are only

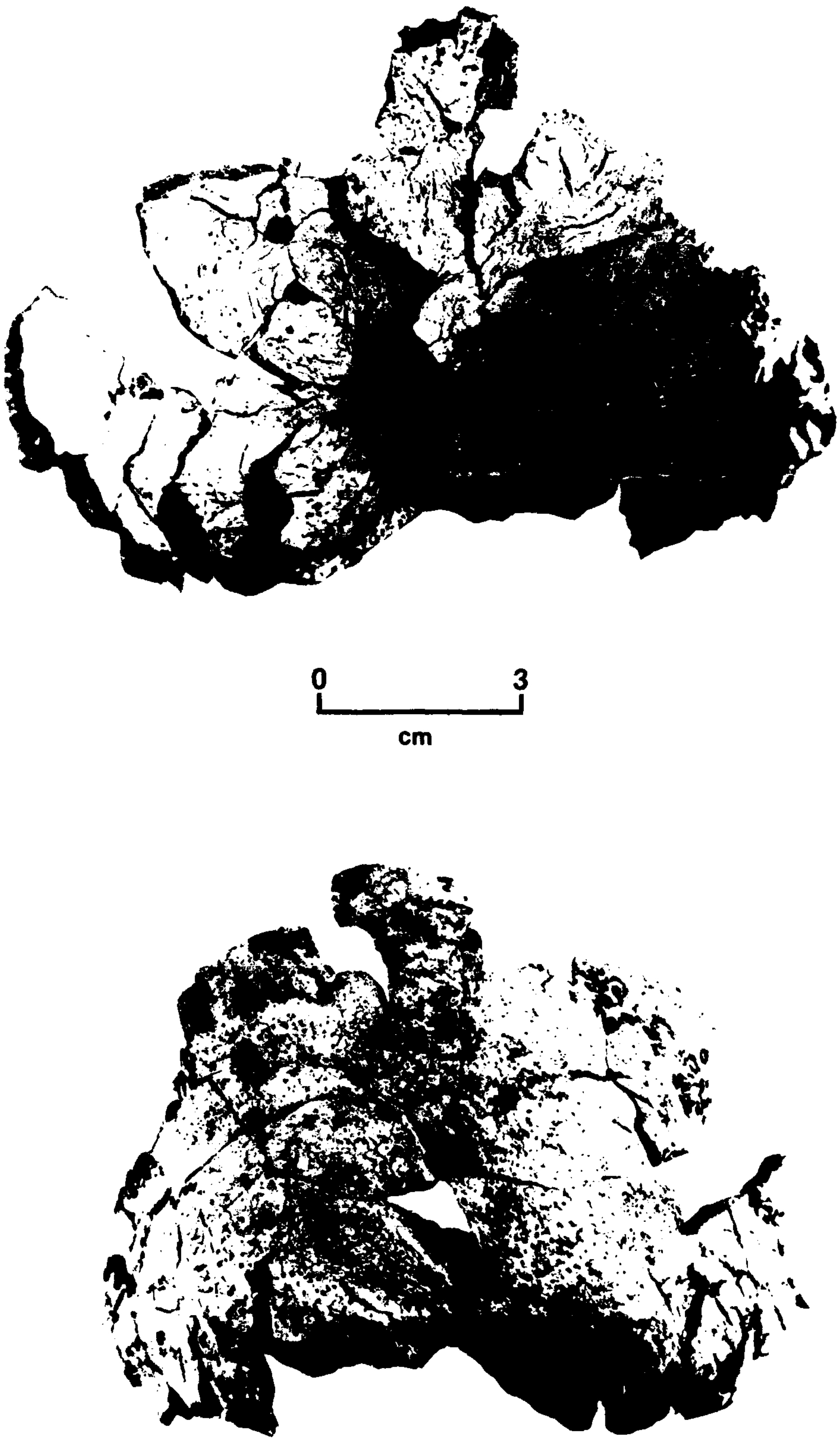


Figure 9.2. Reconstructed occipital portion of skull from Feature 1 at 14SH101. Anterior view (above shows the warping and cracking effects of cremation in the flesh. Posterior view shows the well-developed nuchal crest that identifies the individual as an adult male. The occipital is reconstructed from 18 fragments.

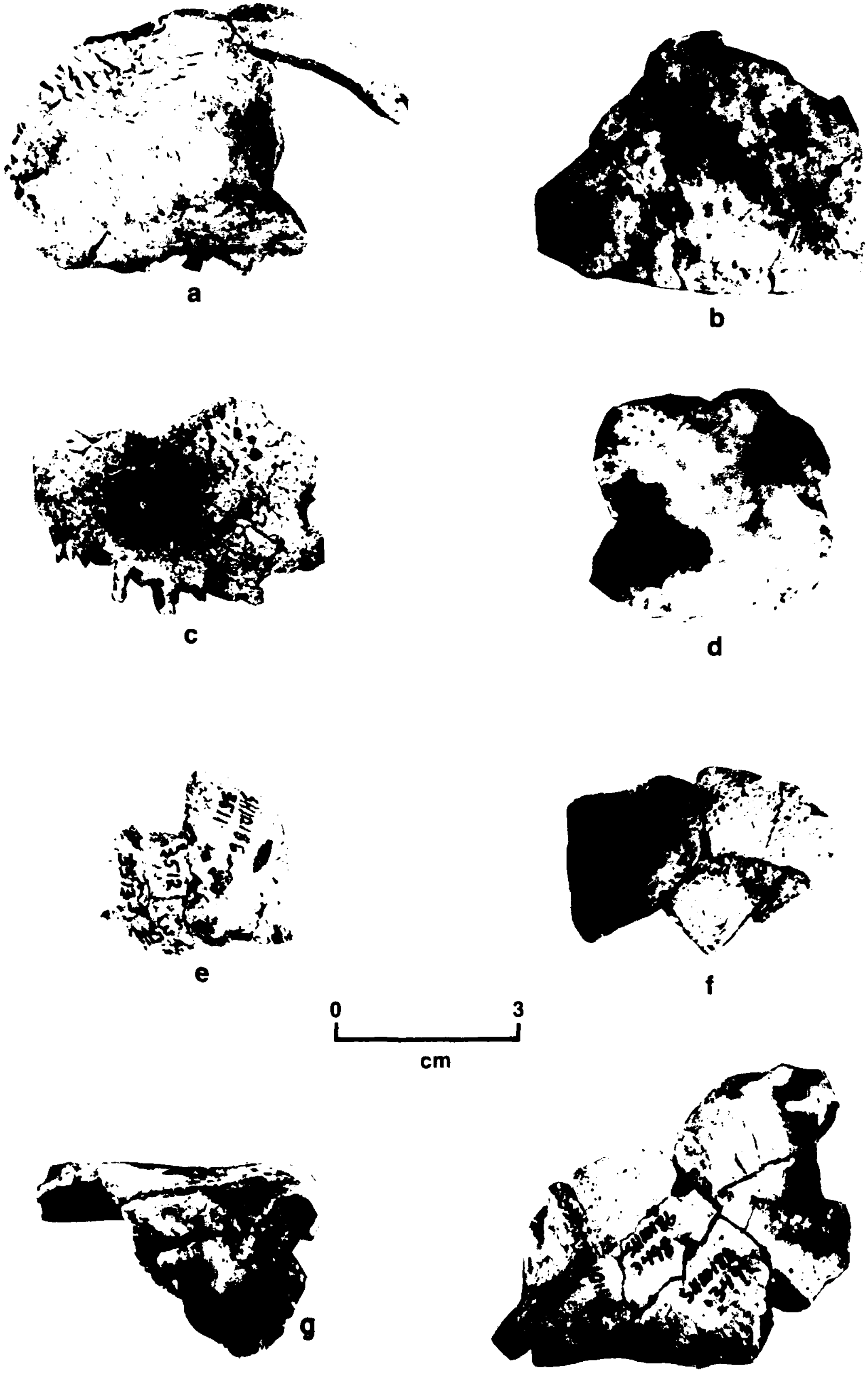


Figure 9.3. Selected fragments of calcined cranial and post-cranial bone from Feature 1 at 14SH101. a) left parietal, SH101863657-SH101863658 b) frontal, SH101865090-SH101865092 c) right parietal, SH101863574 d) left parietal, SH101863659 e) humerus head, SH101863511-SH101863514 f) cranial fragments, SH101863567-SH101863570 g) right lateral view of frontal fragment, SH101863490-SH101863500 h) anterior view of same frontal fragment. Fragments a and c were later articulated with the occipital shown in Figure 9.2.

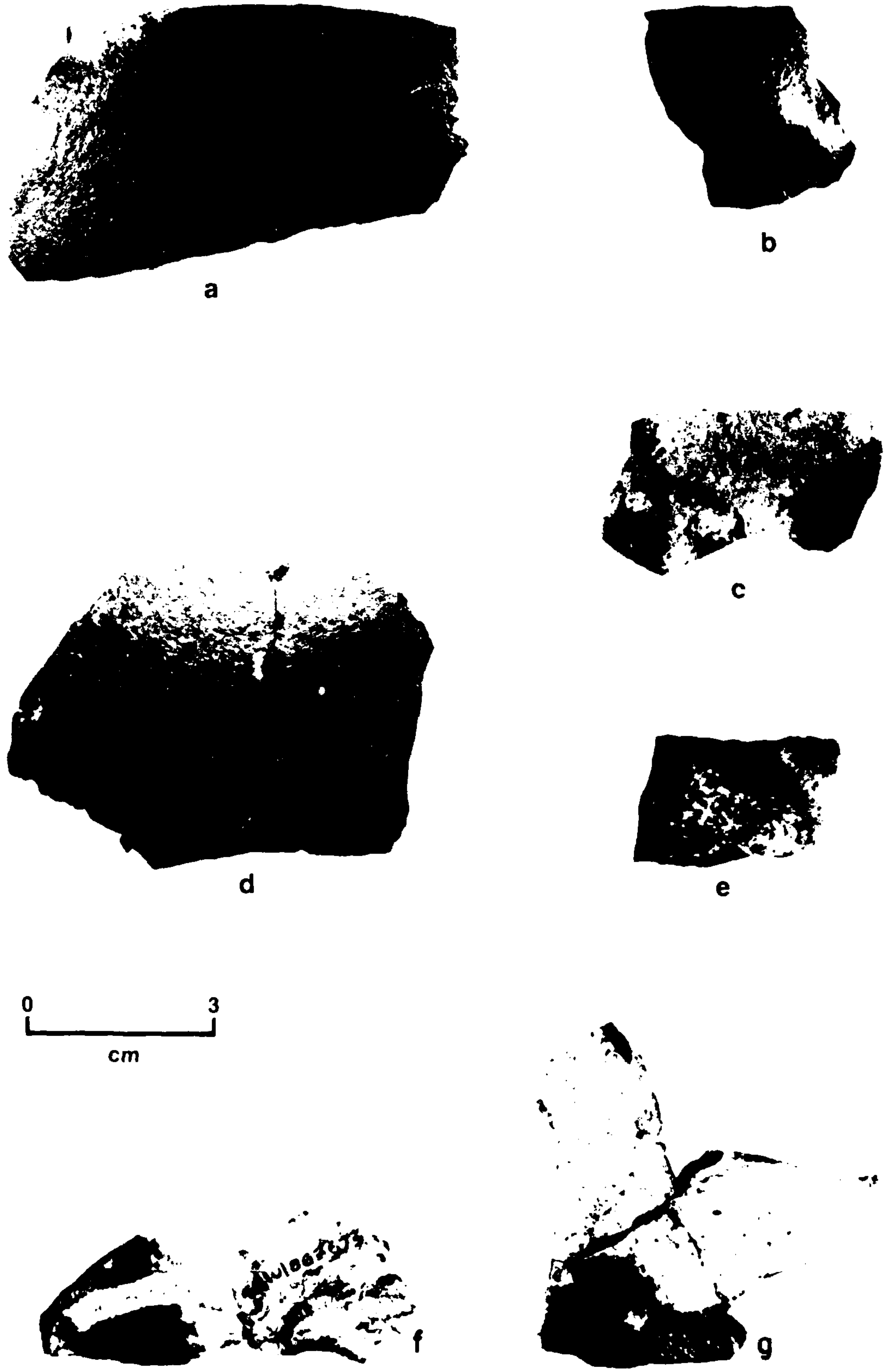


Figure 9.4. *Selected non-calcined cranial fragments from Feature 1 at 14SH101.* a) frontal fragment, left of midline, SH101865098 b) left mastoid, SH101862418 c) left parietal fragment at the sagittal/coronal sutures, SH101862422-SH101862423 d) right frontal?, SH101863671-SH101863672 e) cranial fragment, SH101865095 f) left parietal along the temporal squama, SH101863673-SH101863674 g) left and right parietal fragment at the sagittal suture, SH101862419-SH101862421.

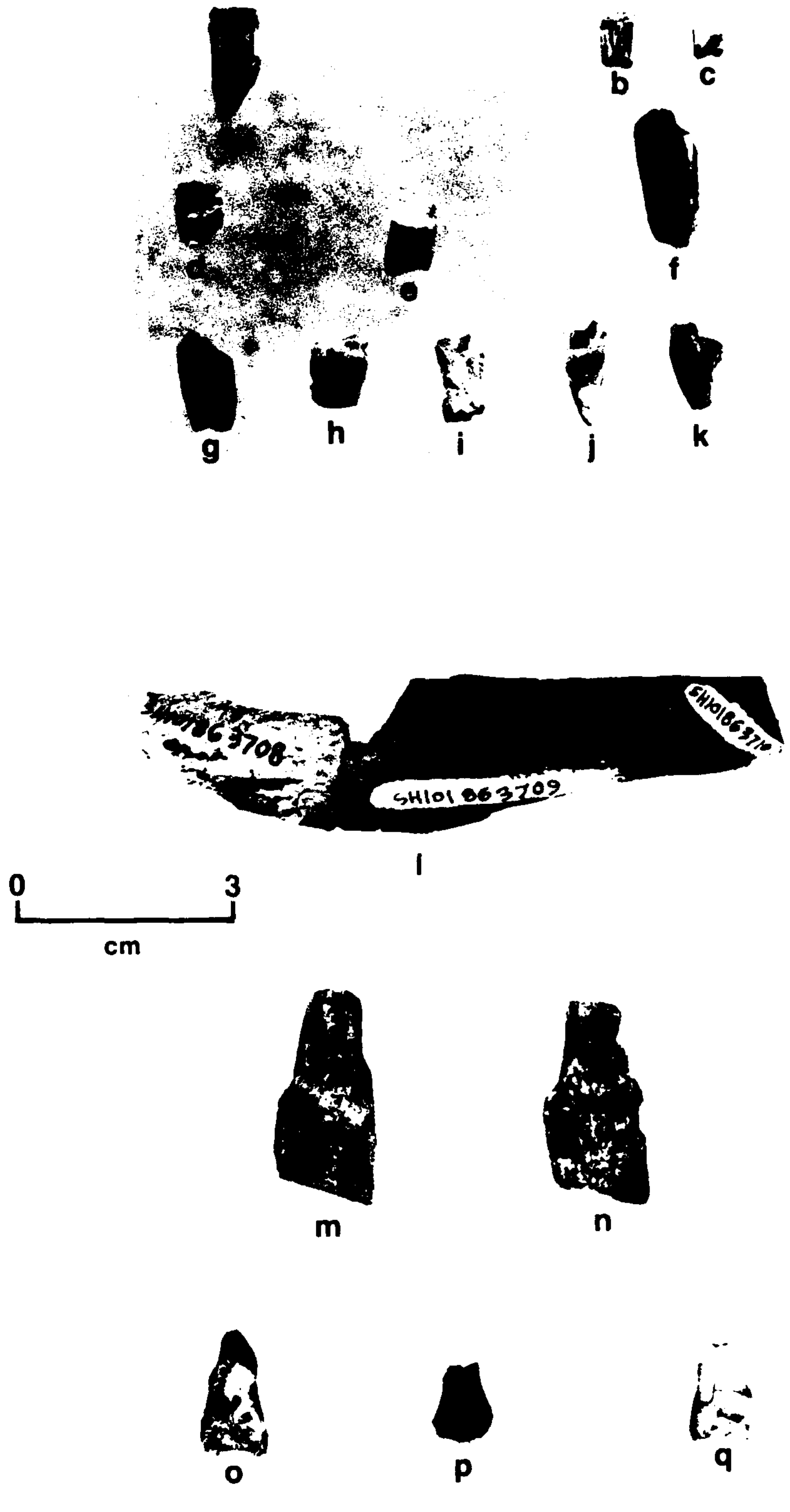


Figure 9.5. Selected teeth fragments and post-cranial bones from Feature 1 at 14SH101. a-k) teeth fragments, in alphabetical order, SH101864448, SH101865979, SH101865979 (b and c), SH101865540, SH101863948, SH101865424, SH101862436, SH101862437, SH101862438, SH101862439, SH101862440. Fragment h is an upper fourth premolar and k is a root fragment of a lower third molar. l) long-bone fragment, SH101863708-SH101863710 m) proximal metatarsal SH101865568 n) proximal metatarsal #3, SH101863519 o) distal end of foot phalanx, SH101865980 p) distal end of phalanx (lateral view), SH101865981 q) distal end of phalanx, SH101863773.

blackened (Fig. 9.4) and other frontal, occipital,parietal, and temporal pieces are completely incinerated (Fig. 9.3) suggests that at least two persons were cremated. Frontal bone fragments SH101865090-5092 and SH101865098 (Fig. 9.3b) are from the same place along the midline of the cranium and therefore must represent two different persons. A blackened fragment of an occipital along the midline (SH101864489) and the reconstructed occipital (Fig. 9.2) also represent two individuals (perhaps the same ones indicated by the frontal fragments).

Finally, there is a difference in the thicknesses of the calcined and uncalcined cranial pieces. Brothwell (1981:16) suggests that "skull (vault) fragments of noticeably different thicknesses may also show the presence of more than one person" in a cremation. The calcined fragments are relatively thin and the brown and/or black pieces are comparatively thicker. At no point do these contrasting fragments grade into each other in terms of color and neither do they cross-mend. For example, a thick, blackened left mastoid fragment (Fig. 9.4b) does not join the left portion of a thinner, calcined, occipital (Fig. 9.2). The contrast in color, thickness and fit prevents similar cross-mends of other cranial fragments. It might be argued that the lack of color gradation alone among these fragments cannot be used as a criterion for distinguishing two crania but that the contrast reflects breakage of a single cranium prior to burning and the differing exposure of the resulting fragments to fire. It might also be suggested that the contrast in thickness reflects shrinkage on the part of the calcined fragments (incineration can result in as much as 25% shrinkage; Ubelaker 1978:31). However, the overall impression obtained when <u>all</u> factors are considered is that at least two different individuals are represented in the assemblage and that they were not cremated in the same manner. At least one cranium, represented by the occipital, parietal, temporal and frontal pieces shown in Figures 9.2 and 9.3, was completely incinerated. A second cranium, represented by frontal, parietal and mastoid fragments shown in Figure 9.4, was only briefly exposed to fire. Whether the individuals were burned at the same time or on separate occasions cannot be determined with the data at hand.

Age and Sex

Given the fragmentary state of the cremated remains, determination of age and sex is difficult. No deciduous teeth are present in the assemblage. Indeed, the few recognizable teeth evidence considerable wear reflecting advanced age. An example of this is a left mandibular third molar with extreme wear on the crown. The occlusal surface has been worn to the extent that the dentine is completely exposed and the crown reduced to near the root line. A second tooth, an upper fourth premolar (Fig. 9.5h), also exhibits much wear.

Suture closure of cranial fragments does not provide a reliable guide, in this instance, of age (Dr. David Frayer,

Department of Anthropology, University of Kansas, personal communication, 1987). Warping and distortion has caused some pieces of the reconstructed occipital to pull apart in some areas but not others, where closure is evident, along the same suture (e.g., Fig. 9.2). The well-developed nuchal crest on the reconstructed occipital indicates adult age. The same feature also suggests the individual was a male. Several of the black cranial pieces (e.g., Fig. 9.4c, g) came apart without distortion along the coronal and sagittal sutures. However, this material does not provide sufficient data for age determination.

Mortuary Practices and Regional Comparison

Little is known about mortuary practices during the prehistoric period in the Wakarusa River basin. Previous investigations in the project area resulted in the discovery of only one other mortuary feature, a burial at the Anderson site (14DO32). Johnson (1968:35) provides a brief description of this feature, which consisted of a pit that contained "a few fragments of human bone" representing two individuals. These were identified as an adolescent and an infant. Although some of the bones of the former were found in anatomical order, suggesting incomplete decomposition of the body, the burial was interpreted as secondary. No evidence of cremation was noted. Unfortunately, no cultural affiliation was suggested for the feature. Although it was found within three meters of structural remains identified as Clinton phase (Pomona variant), the site also contains an earlier Deer Creek phase (Plains Woodland) component (see chapter 6).

Since both radiocarbon dates and an associated projectile point indicate the crematorium at 14SH101 dates to the Deer Creek phase of the Plains Woodland period (see chapter 6), comparison to other Woodland mortuary features in the Central Plains may provide insight into this aspect of Woodland lifeways in the region. In the following discussion, evidence of cremation from this period in northwestern Missouri and northeastern Kansas will be described.

One of the earliest investigations of a burial mound that can now be assigned to the Woodland period in northwestern Missouri was conducted by George Remsburg, an amateur archaeologist who investigated a number of sites in northwestern Missouri and northeastern Kansas around the turn-of-the-century. In a brief newspaper article, Remsburg (1893a) described a limestone mound on Sugar Creek (Buchanan County?) that contained burned bones.

The earliest professional investigations of burial mounds in the Kansas City area were those of Waldo Wedel and J. Mett Shippee. In his collation of traits concerning these features, Wedel (1943:176-177) noted evidence of cremation in 11 mounds at 6 sites in the Kansas City locality. These include the Pearl, Nolan, Young, Brenner, Keller, and Birmingham sites.

All are located in Platte and Clay Counties, Missouri. In describing these mounds, Wedel (1943: 180) noted that,

> most of the vaults contain quantities of hard burned earth and charcoal, and often some of the stones in the walls appear to have taken on a red color due to great heat. Human remains are almost invariably disarticulated, usually fragmentary, and in many instances are partially or wholly charred. Cremation was evidently the rule; this must often have been done outside the vault, though fires were sometimes maintained within also.

Wedel (1943:184) was of the opinion that these mounds were built by the Kansas City Hopewell folk.

Larsen and O'Brien (1973) describe Cochran Mound, a stone-lined vault of the Kansas City Hopewell complex on a bluff top overlooking the Missouri River in Platte County, Missouri. The cremated remains of six individuals, including four adults, one adolescent and one infant, were found. No evidence of burning within the vault itself was noted suggesting the cremation occurred elsewhere. The fragmentary remains consisted of 1,177 pieces representing all portions of the skeleton. Of this total, 767 fragments were unidentifiable. Of the identified fragments, cranial pieces numbered 173 and post-cranial parts totaled 237. Considering the ratio of cranial to post-cranial fragments in the mound in comparison to their relative proportion in a complete skeleton, purposeful selection of the former over the latter for secondary interment seems to be indicated.

The Cogan Mounds, like Cochran Mound, are located on a bluff of the Missouri River in Platte County, Missouri (Tjaden 1974). The site includes two mounds containing stone-lined vaults. Although both vaults contained pieces of burned limestone and burned bone, no evidence of burning within the chambers themselves was noted. Mound 1 contained the remains of at least five persons, three adults, an adolescent, and an infant. Remains in Mound 2 could only be identified as those of a single adult. In both cases, the minimum number of individuals was determined from the relatively large number of cranial fragments present. Post-cranial pieces, though present at both vaults, were not as well represented. Again, this may reflect a greater bias toward inclusion of skull parts in the burials.

The mortuary practice that prevailed in northwestern Missouri during the Kansas City Hopewell phase of the Woodland period entailed cremation followed by secondary burial in stone-lined, earth-covered mounds. Mortuary patterns during the subsequent Late Woodland period are, however, not as well known. One burial that dates to this period has been reported from Short Creek in Platte County, Missouri (Frayer and Bradley 1979). This burial consisted of the nearly complete remains of a single adult female. A bundle type interment is reflected

in the manner in which the bones were found. Evidence of burning of the corpse was noted in the form of small blackened areas on portions of the mandible, on the skull near the left nuchal plane, and in the form of charcoal stains on the neck of the left humerus. According to Frayer and Bradley (1979:25), "this burning does not represent a cremation; the burning stains indicate only a low fire". They suggest the limited burning was caused by firing the body for a brief period sufficient to rid it of insects or odor, or to reduce the amount of flesh prior to dismemberment.

In Kansas, the practice of cremation during the Woodland period has been noted at a number of sites. The first recognition of this trait occurred October 4, 1830, when the Rev. Isaac McCoy opened a burial mound (one of eight at the site) on Salt Creek in Leavenworth County. The stone-lined vault contained charred skeletal remains, including "skuls", of an indeterminate number of adults and children. Noting that "the burning was not intended to reduce the bones to ashes, because this had not been done", McCoy interpreted the evidence as the result of human sacrifice (Barnes 1936:360). It is now apparent that McCoy had excavated a Woodland mound containing cremated remains similar to those described by Wedel (1943).

Remsburg also investigated mounds in Atchison County, Kansas that contained evidence of cremation. At the Ingalls Mound on Walnut Creek, Remsburg (n.d.) opened one of two such features consisting of alternate layers of earth and stone with the burned and decomposed remains of "nearly a dozen" individuals. It is apparent from his description that the remains represent a secondary, bundle burial. Another mound, one of two on a bluff near the mouth of Owl Creek, consisted of an earth-covered, stone-lined vault that contained charred, calcined bone fragments "intermingled with ashes, charcoal, burnt earth and stones" (Remsburg 1893b:7-8).

The practice of interring cremated remains in mounds is a hallmark not only of the Kansas City Hopewell but of the Woodland period in the eastern portion of North America (Willey 1966:267-268). In Kansas, this practice extended as far west as Barton County (14BT407) and along the lower Republican River valley of Clay and Geary Counties. Schultz and Spaulding (1948) describe such a mound at the Younkin site in the latter county. Again, as in the examples from the Kansas City locality, a bluff-top setting overlooking a major stream valley was selected. Skeletal remains in the mound are described as follows:

> With the exception of [an] extended skeleton, which was presumably a flesh burial, the burials are simply areas of concentration of bone fragments, comprised mostly of parts of cranial and long bones. Ten such areas were observed within the central depression, and may have been individual loads of bone fragments brought to the burial site. A few of the fragments within the central

basin are scorched or calcined, suggesting partial cremation before their interment, and a number of calcined pieces were found in the stones and earth of the fill above. Whether the latter were accidentally included at the source of the construction material, deliberately added to the fill, or were in some way derived from the primary deposits below is not clear. The available evidence does not indicate firing *in situ*.

The Younkin Mound was considered by Schultz and Spaulding (1948:311-312) to be evidence of a westward expression of the Kansas City Hopewell complex. Mortuary sites such as Younkin Mound were later employed to define the Schultz Focus for the Woodland period of northeastern Kansas (Eyman 1966; Phenice 1969). The Schultz Focus was considered to be the result of diffusion of Hopewellian traits to Plains Woodland peoples in the lower Republican and upper Kansas Rivers. Unfortunately, considering the limited data used to define the complex, its taxonomic foundation is weak.

Mortuary practices for the Grasshopper Falls phase of northeastern Kansas are poorly known. According to Reynolds (1979:74), the only human remains associated with a site of that phase were "sections of an adult mandible and associated skull fragments and a primary infant burial" found at 14JF350. The adult remains came from culturally mixed fill of a Grasshopper Falls phase habitation and the infant was found in a small sub-floor basin at the center of that structure (Reynolds 1979; Barr 1971). Six burial mounds had been recorded in the Delaware River valley, north of the project area, at the time of Reynolds' report and these he was reluctant to attribute to any specific Woodland complex.

"Scorched" human remains were reported by Wedel (1959:172-174) at the Ras Matherson site, which consisted of two mounds on a ridge west of lower Wolf Creek valley in Doniphan County, Kansas. One of these contained two burials and a shallow basin. Human bones from one of the burials and the basin were fire-blackened. Wedel surmised the interments and the basin were produced by the same people but he was unable to assign them to any culture complex.

In the same area, evidence of cremation is forthcoming from Taylor Mound, located on a high bluff on the west bank of the Missouri River near White Cloud, Kansas. O'Brien (1971) has assigned the mound to the Valley focus of the Plains Woodland period. Cremated remains were discovered in a zone overlying a stone-lined burial cist. Three radiocarbon dates from this zone all fall within the period from A.D. 1 to 300. Johnson (n.d.) suggests, however, that the few Hopewellian ceramic artifacts found together with Valley Cord Roughened ware date to a later time period, A.D. 400 to 500.

The evidence presented above clearly indicates that crema-

tion was part of mortuary practices during at least part of the Woodland period in the Kansas and Missouri Rivers locality. Much of this evidence dates to the Middle Woodland period and is attributable to the Kansas City Hopewell and, perhaps, to their influence on other Plains Woodland groups in the area. The pattern that emerges is one of primary cremation, generally in an area away from the final place of interment, followed by selection of incinerated fragments and their burial in a mound on a prominence, such as a high ridge or bluff top. As far as the author is aware, no place of cremation other than some of the mound chambers themselves has ever been discovered in the region. Since Feature 1 at 14SH101 is suggested to be a crematorium, and not the remains of a burial, it provides the first archaeological evidence of the primary phase of the Woodland mortuary ritual in this area.

Conclusions

Feature 1 at 14SH101 consists of a concentration of burned limestone, burned earth and charcoal that contained sparse lithic artifacts (including one Scallorn arrow point) and an abundance of burned, highly fragmented human bone. Analysis of the human remains indicates at least two individuals were cremated. There is some suggestion that they were cremated in different fashion, or at least to differing extents. Based primarily on calcined cranial fragments, one individual, an adult male, was apparently thoroughly cremated. The second, whose age and sex are presently undeterminable, was not completely incinerated.

The individuals are not well represented in the bone assemblage. It is likely that those who cremated them selected many of the larger surviving pieces from the pyre, once it cooled, and intered them in another locality, perhaps a nearby bluff top overlooking the Wakarusa River valley. We are not able, at present, to say that certain elements were selected for burial since only a portion of the feature was excavated and additional skeletal material may well be found upon further investigation. It seems unlikely that the feature itself is the remains of a burial mound or other feature. The topographic setting, a terrace in the Wakarusa River valley, does not fit the upland aspect of the typical Woodland mortuary pattern. Moreover, the feature was found within the limits of a habitation site that, by other diagnostic evidence, is contemporary with it. Burial of cremated remains at the site of residence also does not fit the Woodland pattern. Finally, the structure of the feature, so far as it is now known (see chapter 6), is unlike that of any burial of the Woodland period.

The importance of this feature for understanding mortuary customs during the Deer Creek phase and the Woodland period in general in the Central Plains cannot be underestimated.

Chapter 10

SITE EVALUATIONS, RESEARCH GOALS, AND RECOMMENDATIONS

Brad Logan

Introduction

As stated in the first chapter of this report, the purpose of the Clinton Lake archaeological investigation was to evaluate the data from 27 archaeological sites in terms of their potential eligibility for the National Register of Historic Places. Placement of sites located on Federal lands on the National Register may provide sites with protection from harmful impacts that would adversely affect their potential for providing answers to important questions concerning the human prehistory or history of the United States.

The Antiquities Act of 1906 (Public Law 59-209) was the first legislation enacted by Congress for the protection of historic and prehistoric archaeological sites situated on federally owned or controlled lands. The Historic Sites Act of 1935 (Public Law 74-292) was enacted "to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States". The National Historic Preservation Act of 1966 (Public Law 89-665) created the National Register of Historic Places as a list of propoerties "significant in American history, architecture, archaeology, and culture" (Sec. 101 (a)(1)). Criteria for evaluation and determination of eligibility for nomination to the National Register of Historic Places are set forth in 36 CFR60.6 (a):

> The quality of significance in American histor . architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b) That are associated with the lives of persons significant in our past; or
>
> c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) That have yielded, or may be likely to yield, information important in prehistory or history.

The National Environmental Policy Act (NEPA) of 1969)Public Law 91-190) requires federal agencies to consider the environmental impacts of planned projects. As a result, since cultural resources are part of the environment, federal agencies are required to identify and plan for the protection of cultural resources, both prehistoric and historic, during their project planning and land management programs. Executive Order 11593, Section 110 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to identify historic properties under their control or jurisdiction that might qualify for the National Register. The Archeological and Historic Preservation Act of 1974 (Public Law 93-291) specifically provides for the preservation of archaeological and historical data "which might otherwise be irreparably lost or destroyed" as the result of federally constructed dams or as the result of any federally funded or assisted construction project, activity, or program.

In accordance with the above cultural resource management regulations, federal agencies are required to determine the National Register eligibility of archaeological resources under their control. This is accomplished by assessing information and recommendations provided by archaeologists. Raab and Klinger (1977:632) suggest that "the best approach to assessing archaeological signficance is in relation to explicit, problem-oriented research designs". Yet no research design can begin to cover the myriad problems that are answerable with archaeological data. Raab and Klinger (1977:632) are aware of the limitations of any particular research design. They point out that "if the archaeological record can provide a broad range of useful information, then it follows that there is no portion of it that is not significant to some range of research questions". Sharrock and Grayson (1979:327), in a comment on the article by Raab and Linger, argue that determinations of site significance, or insignficance, based on tested hypotheses of an explicit research design may not be sufficient from the perspective of federal agents who have the ultimate responsibility for judging a site's eligibility for placement on the National Register. They agree that although significance determined in this way is "an excellent reason to ascribe significance in the National Register sense", the opposite may not necessarily be true. Just because an archaeological resource is found to be insignificant in terms of a current research design, it does not necessarily follow that the site is, in fact, insignificant. "The 'significance' of a site is clearly subject to change through time, increasing or decreasing as both knowledge and research orientation change" (Sharrock and Grayson 1979:327).

The essence of the dialogue between these two parties is that one (Raab and Klinger) believes the guidelines established for assessment of eligibility for the National Register are so

broad they are of little use to archaeologists, while the other believes such breadth is necessary in order to guarantee that no site with some research potential is lost. This problem of potential significance, however, is anticipated in the National Register criteria. Archaeological resources are significant when they "have yielded, or may be likely to yield, information important in prehistory or history" (36CFR60.6). As a result, federal agencies bear the burden of proving that sites within their domain are neither significant or potentially significant. As stated earlier, this is accomplished by acting upon information and recommendations provided by the contracting archaeologist. "The importance of the contracting archaeologist's assessments of significance cannot be overemphasized" (Klinger and Raab 1980:556).

Once a site has been determined not to be significant, it is excluded from further federally funded research and does not receive protective managment consideration. Therefore, it is important that the potential significance of an archaeological resource be carefully considered. The full archaeological potential of a site may be difficult to realize if its significance is poorly documented.

Glassow (1977) outlines five main properties of archaeological resources that should be used to determine potential significance. These are variety, quantity, clarity, site integrity, and environmental context. For variety, it is ideal to preserve representative forms of all types of archaeological resources within a defined region. This includes isolated occurrences as well as complex sites. For quantity, it is ideal to preserve representative samples of the variability in site frequencies within a defined region. For clarity, it is ideal to preserve representative samples of the range in which sites occur in the natural environment, such as stratified sites and non-stratified sites of the same cultural complex within a defined region. Site integrity concerns the degree of preservation of a cultural resource. Finally, for environmental context, it is ideal to preserve representative samples of sites belonging to the same cultural complex that occur in varied natural environments, such as riverine, upland, grassland, and forested regions.

Stuart and Gauthier (1981) have synthesized the arguments for particular criteria that should be considered for determina tion of significance by various authors. They propose two major perspectives, or models, for determination of significance: 1) resource model of significance and 2) research model of significance. The resource model is primarily a managerial device, while the research model concerns questions of current archaeological research.

Stuart and Gauthier (1981:352) define the resource model of significance as being a map of the resource areas within defined entities, where the entities are arbitrarily defined and may consist of levels or periods of time, physiographic

zones, soil types, etc. The main criteria for the arbitrarily defined entities is that they be consistent in the manner in which they are used. The arbitrary entities defined (e.g., periods of time, land forms, etc.) are then used to construct a grid. Known sites are organized within the grid according to the way in which they fall within any one of the entities. In this manner, it is possible to evaluate the sites according to their frequency or rarity and to recommend preservation or destruction with or without investigations. A site type that is very rare within the boundary of a project area may be common elsewhere; however, the defined project area under study is subject to known conditions that make it possible to manage the sites within that project area or universe, but not elsewhere. The resource model is simplistic and does not address itself to questions of archaeological concern, but its advantage is that as sites are destroyed within a project region, there is a corresponding increase in the value of the remaining sites.

The research model of significance (Stuart and Gauthier 1981:353) is theoretical in orientation, with the point of reference being the research questions. In this model, site values rise and fall as questions are asked and answered. The frequency of sites of any given type are not necessarily considered. In the resource model, effects of the project area or universe define significance, while for the research model, the research questions define the values for significance. The research model is also arbitrary in the sense that no criteria are made for who asks the research questions and what constitutes valid research questions. In summary, "the quality of significance in archaeology is a relationship between the physical characteristics of sites and the state of knowledge about sites" (Stuart and Gauthier 1981:353).

The articulation of the resource and research models for determining significance allows for a comprehensive treatment of all cultural resources. Because both models address management and research issues, it has been recommended in the Kansas State Archaeological Preservation Plan (Brown et al. 1984:6-12) and other Kansas management plans (Adair et al. 1984:151) that they be considered in formulating recommendations for the management of cultural resources in Kansas. These models were adopted in the following evaluation of the sites investigated during the Clinton Lake archaeological study.

Site Evaluations

Twenty-seven prehistoric sites were investigated during the project. Table 10.1 presents summary data on each of these sites in terms of work done and significance evaluation. Two of the tested sites are recommended for consideration for placement on the National Register of Historic Places. Suggested research goals for archaeologists who might investigate these sites are discussed in a later section of this chapter. Twenty-five sites are not considered eligible for the National

Register. The criteria used to determine the eligibility or ineligiblity of all investigated sites are described below.

Table 10.1. Sites Investigated During the Clinton Lake Archaeological Project: Work Performed and Evaluations

Site No.	Number of Plotted Artifacts	Number of Test Units Excavated	Number of Backhoe Trenches	Stream Bank or Shoreline Inspection	Site* Evaluation (+ -)
14DO15	4	4	0	No	-
14DO16	0	5	0	No	-
14DO19	0	12	5	Yes	+
14DO32	6	7	1	No	-
14DO35	7	12	1	Yes	-
14DO37	1	8	4	Yes	-
14DO39	2	4	1	Yes	-
14DO40	0	5	0	No	-
14DO59	0	4	2	No	-
14DO61	0	4	0	No	-
14DO62	2	5	0	No	-
14DO68	0	4	1	Yes	-
14DO69	0	0	0	Yes	-
14DO75	0	4	0	No	-
14DO137	0	12	1	No	-
14DO138	0	4	0	Yes	-
14DO141	5	5	0	No	-
14DO142	0	4	0	No	-
14DO153	0	4	1	No	-
14DO155	6	5	0	No	-
14DO157	1	4	0	No	-
14DO309	2	12	1	No	-
14SH5	1	4	0	No	-
14SH6	0	4	0	No	-
14SH101	7	10	4	No	+
14SH102	0	4	1	No	-
14SH103	1	4	1	No	-

* + denotes significant - denotes not significant

Twenty-five sites are not recommended for National Register consideration. It is the author's opinion that these sites lack either one or more of the following criteria necessary for recommendation: sufficient quantity of cultural material; sufficient variety of cultural material; and, sufficient depth and integrity of cultural deposits (see site recommendations in chapter 6). Most of the sites are considered not significant because of a lack of depth. It is too often the case in the Clinton Lake area that sites contain shallow cultural deposits that have been vulnerable to plowing. Only sites 14DO16, 14DO19, 14DO32, 14DO37, 14DO62, 14DO68, 14DO155, and 14SH101 contained any cultural materials below plow zone. Unfortu-

nately, at 14DO16, 14DO32, 14DO37, 14DO62, and 14DO68, the quantities of material found in the levels below plow zone are much smaller in comparison to those in the upper levels of the same excavation units. It is likely that this quantitative difference reflects disturbance of soils by rodents, tree roots, or dessication. Documentation of such disturbance processes was recorded at some of these sites. For example, four flakes were found vertically oriented in dessication cracks just below plow zone in Unit 3 at the Anderson site (14DO32). Such finds indicate the downward movement and reorientation of artifacts caused when dry conditions result in the opening of vertical cracks in the soil (Wood and Johnson 1978). Identifying these "cracks" at the Anderson site was possible because the A horizon soil, which filled the cracks, differed significantly in color from the B horizon. Two flakes were recovered at a depth of 25-30 cm below surface in a rodent burrow in Unit 2 at 14DO37. Evidence of rodent activity was also noted in the lower levels of Unit 1 at 14DO62, where small amounts of debitage were found. Artifacts were found in lower levels of units at 14DO68, but in small numbers. Although no apparent evidence of disturbance was noted at this site, the small quantity of material recovered ,and its undiagnostic nature, precludes a recommendation of significance.

An interesting example of artifact burial was recorded at 14DO155 but this process is attributable to farming practices. The number of flakes in Unit 1 <u>increased</u> in successively lower levels (see chapter 6). However, this frequency change is the opposite of that in all other units at the site, where the number of artifacts decreases below plow zone. Based on geomorphic evidence, it is evident that this phenomenon is attributable to slopewash and redeposition of soil material from the northeast portion of the site area to the southwest corner of the site, near the edge of the cultivated field, where the soil has been artificially thickened. Although this process has effectively preserved a portion of the site's deposits, this portion is too small to warrant consideration of the site as a whole for the National Register.

Thus, only two sites, 14DO19 and 14SH101, contain sufficient depth and integrity of cultural deposits, or the quantity and quality of artifacts and features necessary to recommend them for National Register nomination. The Hatcher site warrants consideration based on the evidence of a structure or portion of a structure of the Pomona variant in Area A and the presence of a buried component of unidentified affiliation in Area C. Excavation of Units 7 and 8 in Area A revealed a concentration of daub and associated artifacts that extend below plow zone. This occurs in proximity to a structure that was only partially revealed during excavations at the site by the University of Kansas in 1966 (Johnson 1968). In the time since that investigation, the Clinton phase (to which that structure was then assigned) has been redefined as a phase of the Pomona variant of the Plains Village period (Brown 1985). In the process of redefining the Clinton phase, Brown (1985)

raised a number of problems for future research that can be addressed through the investigation of sites such as 14DO19. Some of these research problems will be discussed in the following section of this chapter.

Test unit and backhoe excavations in Area C at the Hatcher site revealed a hitherto unknown buried component. Although this area had been excavated by the University of Kansas in 1966, the emphasis at that time was on a more shallowly buried component of the Clinton phase (Johnson 1968). The excavation of Trench 3 in this area during the Clinton Lake Archaeological Project demonstrated that *in situ* deposits, including both lithic and faunal materials, are present at a depth of 70-80 cm below surface. The research potential of this component, which stratigraphically predates that investigated in 1966, has yet to be explored. Considering the rarity of stratified deposits in northeastern Kansas, the Hatcher site should be considered for National Register eligibility on the basis of this finding alone. Given the fact that deposits in Area A also warrant such consideration, the site can be viewed as doubly significant.

Surveys in Area A at 14SH101 revealed an extensive scatter of artifacts of a varied nature, including not only the debitage so ubiquitous at prehistoric sites but a relatively high quantity of chipped stone tools and pottery fragments as well. Test excavations in this area delimited some cultural material below the plow zone and away from the terrace edge, where erosion has not been as deleterious to the deposits as it has near the scarp. Moreover, one feature was discovered that is considered to be unique in this region of the Central Plains. This is the remains of a crematorium, composed of a half-circle concentration of burned limestone, charcoal, burned earth, burned human bone, and lithic material. Diagnostic artifacts (both pottery and arrow points) from the site as a whole, demonstrate a Deer Creek phase (Plains Woodland) affiliation. Radiometric analyses of charcoal from the crematorium now provide the first absolute dates for this complex. The Deer Creek phase was defined, tentatively, by Johnson (1968) on the basis of investigations in the Clinton Lake area by the University of Kansas in 1966. It is now apparent that 14SH101 contains data that could shed much light on this poorly known complex. For this reason, the site is considered significant.

The two sites considered significant for understanding the prehistory of the Clinton Lake area are discussed below in the context of the research goals outlined in chapter 1. Moreover, more specific research problems are outlined for archaeologists who may have the opportunity to investigate them in the future.

Research Goals

It is suggested that 14DO19 and 14SH101 contain data that could be used to address the four problem domains discussed in the introduction to this report; culture history, site func-

tion, lithic resource procurement, and settlement patterns. Each site is examined below in regard to these research problems and specific questions concerning them are presented.

14DO19: The Hatcher site consists of three areas, as defined by Johnson (1968) and recognized in this report (see chapter 6). Area B was determined to have been largely eroded and without significant *in situ* cultural deposits in 1966 (Johnson 1966). This finding was confirmed by our excavations. The research domains, thus, are to be addressed with regard to the data recovered from Area A and Area C.

A daub concentration in Area A indicates that a structure, or portion of a structure, of the Clinton phase of the Pomona variant remains for future investigation. It is suggested that the daub represents an unexplored portion of the structure partially delimited in 1966 (Johnson 1968). A radiocarbon date of 970±60 B.P.: A.D. 980 (Beta-19873) was obtained during the Clinton Lake Archaeological Project from a curated sample of charcoal collected during the 1966 investigations from Feature 2 in that structure. This date was averaged with a prior date of 1075±65 B.P.: A.D. 875 (Brown 1985) obtained from a charcoal sample with the same provenience and collection history. The average is 1018.3±44.1 B.P. This average was then calibrated to 950 and 935 B.P. (A.D. 1000 and 1015; Stuiver and Becker 1986, see Appendix 2). The date obtained from Feature 2 not only corroborates that obtained by Brown (1985) but provides the means to tighten the chronological placement of the Clinton phase. In this regard, we have satisfactorily refined one aspect of the culture history of the Clinton Lake area.

Brown (1985) examined the data from this site, as well as data from other sites in eastern Kansas, in order to define the Clinton phase and the nature of the Pomona occupation in that area. In doing so, he outlined several problems that remain concerning this complex. Foremost are the interrelated problems of site function and settlement patterns. Brown (1985: 407-411) noted that house structures at Pomona sites are generally delineated by daub concentrations, such as that explored in Area A at Hatcher, and that these concentrations are generally small in size. He suggested that the daub represents clay that was packed around the base of a structure of pole framework and tallgrass construction, providing a means of support. Grass impressions in samples of daub from a Pomona house in the Melvern Reservoir (14OS314) that he submitted to Ronald McGregor of the University of Kansas Herbarium were identified as prairie cord grass (*Spartina pectinata*) and, possibly, switchgrass (*Panicum virgatum*). In his analysis of opal phytoliths from a sample of daub recovered at the Hatcher site during the the 1986 investigations, Steven Bozarth identified the same types of grasses using a different form of data (see chapter 9). We have, thus, an independent check on the methods of lodge construction for the Pomona variant. An abandoned meander of Rock Creek in the immediate vicinity of the structure in Area A could easily have contained a wetland grass, such as prairie

cord grass. Thus, Bozarth's analysis indicates this meander was probably already abandoned at the time of occupation and that it provided a necessary resource for the site's inhabitants.

That the site served as a habitation during the Clinton phase seems clear. At what time of the year this site was occupied is not yet known. Brown (1985:450-453) has suggested that the Pomona settlement pattern was a continuation of that established during the preceding Late Archaic and Woodland periods in the region. This pattern entailed occupation of lowland localities during the late fall and winter months, when flooding was not a hazard, and occupation of upland sites during the warmer months. If this is true, then lowland sites such as Hatcher may yet provide seasonal data to confirm a winter occupation. Future investigators may want to explore this aspect of the research potential of the Hatcher site.

Investigations in Area C at the Hatcher site determined the presence of a buried component that stratigraphically underlies a Pomona component. The latter was thoroughly investigated by the University of Kansas in 1966 and does not warrant further exploration. However, the cultural affiliation of the lower component still awaits identification. For this reason, future investigators will want to approach that area with a more basic culture-historical problem orientation. It is possible that the lower component indicates an earlier Pomona occupation or that of an earlier period (Woodland?). If the latter case is true, then Area C at Hatcher may be the best place for addressing the question of Pomona origins. Both Witty (1978) and Brown (1985) have suggested that the Pomona complex is derived from an indigenous Woodland base in eastern Kansas. However, the transition from Woodland to Pomona has yet to be traced archaeologically. A comparison of data from the lower and upper components at the Hatcher site could shed light on this perplexing problem.

<u>14SH101</u>: Although the material recovered at this site reflects two possible components, Plains Woodland and Plains Village, it is suggested that the former is more predominant. The discussion here addresses pertinent research problems concerning the Plains Woodland occupation of the site. However, future investigators will also want to determine the extent of any possible Plains Village occupation.

The Deer Creek phase of the Plains Woodland period was very poorly known prior to the testing of 14SH101 during the Clinton Lake Archaeological Project. Johnson (1968:132-133) "hypothesized" the existence of the phase on the basis of excavations at the multi-component Anderson site (14DO32) and on "the examination of surface collections from other sites in the Clinton Reservoir area". He distinguished this phase from the earlier Wakarusa phase on the presence of Scallorn points in the Deer Creek assemblage. This artifact "suggests a somewhat later phase than the Wakarusa which lacks this style of

projectile point" (Johnson 1968:133). He was unable to assign any date to the phase but noted that the presence of three rocker-stamped pottery sherds at the Anderson site indicated some contemporaneity with the Kansas City Hopewell complex.

Investigations at 14SH101 resulted in recovery of Plains Woodland pottery and Scallorn arrow points, indicating a Deer Creek affiliation. The abundance and variety of lithic and ceramic artifacts indicates either prolonged or periodic occupation. A feature identified as a crematorium is also assigned to the Deer Creek phase on the basis of a Scallorn point found in association with it (a second was also found in the plow zone above the feature) and radiocarbon dates from associated charcoal. These radiocarbon assays provide the first absolute dates for the Deer Creek phase.

Three dates were obtained from the crematorium: 1130±60 B.P.: A.D. 820 (Beta-18609); 1460±100 B.P.: A.D. 490 (Beta-18610); and 1400±100 B.P.: A.D. 550 (Tx-5667). The range of two of these dates overlap and their means are quite close. The fact that they were obtained from two different laboratories lends credence to their accuracy. The most recent of the three dates is suggested to be inaccurate and, perhaps, the result of some unidentified contamination. The results of the calibration of that date (see Appendix 2) place the feature in the time range of the Pomona variant occupation of the project area. The only evidence of any Pomona occupation at 14SH101 is in the form of unnotched arrow points.

The two dates whose sigmas overlapped were averaged and the resulting date is 1430.0±70.7 B.P. Calibration of that date resulted in a date of 1311 B.P.: A.D. 639 (Stuiver and Becker 1986, see Appendix 2). It is suggested that this date is accurate for the Deer Creek phase of the Plains Woodland period. It does not conflict with the temporal range of Scallorn arrow points (Chapman 1980:312) or the suggested range of Late Woodland or Plains Woodland complexes in northeastern Kansas and northwestern Missouri (Chapman 1980; Johnson 1984). The absolute chronological placement of the Deer Creek phase, one of the goals specifically addressed in the research design of the Clinton Lake Archaeological Project (Logan 1986), has been obtained.

Future investigators at 14SH101 will want to obtain more information pertaining to site activities, function, and settlement patterns than we were able to recover based on our limited testing. As stated in chapter 7, the lithic assemblage from the site reflects a variety of activities, including stone tool production and maintenance, processing of wood, hides, and meat, preparation of plant foods, and hunting. The variety of raw material types represented at the site also lends a unique cast to the lithic assemblage. It is possible that the greater variety of chert types reflects a broader range of regional procurement and, hence, the mobility of the Deer Creek folk, or it might be due to their periodic return to the site and longer

occupation of it. Certainly this aspect of the site's research potential can be profitably addressed by future investigators.

The ceramic assemblage (see chapter 8) is, relative to others in the study area, well represented and seems to suggest longer occupation than most sites in the Wakarusa River basin. However, greater samples of this material are needed to determine the amount of ceramic variability in the Deer Creek phase. The recovery of more ceramic artifacts may yet make it possible to discern any variation from the preceeding Wakarusa phase ceramic assemblage in the study area and, perhaps, to determine the nature of the relationship (ancestral?) between the two. Moreover, it is necessary to compare not only the ceramic assemblage but the total artifact and feature configuration of the Deer Creek phase to other nearby complexes, such as the Grasshopper Falls phase, in order to affirm its taxonomic integrity.

Finally, the discovery of a crematorium at the site presents new insight into not only the Deer Creek phase but, perhaps, Plains Woodland mortuary practices. As demonstrated in chapter 9 (see section on human remains), Feature 1 is not identifiable as a burial mound, the characteristic mortuary feature of the Woodland period. Rather, it appears to have been the place where the primary phase of the mortuary rites that resulted in mound burial were carried out. At least two persons, one identifiable as an adult male, were cremated. One was completely incinerated shortly after the time of death and the other, based on cranial evidence, only partially burned. It is not possible to determine if some skeletal remains were selected from the ashes for secondary burial elsewhere, although such is suspected. Since only a portion of the feature was excavated during the testing of the site, it is possible for future investigators to establish a series of hypotheses based on data that have been recovered and test them by excavating the remainder. As a guide to these investigators, the following approach is suggested: excavation of the feature with precise piece-plotting of all limestone and associated artifacts in order to more accurately determine its structure and to document the extent of any possible disturbances (i.e., plowing, root action, rodent activity, etc.); careful plotting of all associated human bone in order to facilitate cross-mending of fragments and to determine the extent of post-cremation treatment of the remains (i.e., were the ashes stirred in order to collect fragments or did pieces simply fall apart during burning and remain in place?); collection of additional samples of charcoal for both radiocarbon assays and wood identification; flotation of the feature fill in order to maximize recovery of all remains; consultation with a physical anthropologist to identify the human remains, determine age and sex (and stature, if possible), identify pathologies, etc.

Ancillary to the archaeological investigation of 14SH101, continued geomorphological research should be conducted. Trenching of the T-2 terrace fill revealed an organic-rich sediment

zone at a depth of 137-142 cm below surface (see chapter 3). This zone was radiocarbon dated at 15,350±390 B.P. As such, this deposit dates to the late Pleistocene, a time of full glacial conditions throughout much of North America. Dating the deposition of the T-2 terrace fill and obtaining, if possible, any buried palynological or other biological evidence of the late Pleistocene will provide important environmental information for studies of the early human occupation of the Central Plains. Trenching of the T-0b terrace fill at the site also revealed a buried soil at a depth of 142-177 cm below surface (see chapter 3). Radiocarbon dating demonstrates this horizon had formed by 1240±90 B.P. Since this soil was being developed at roughly the same time as the Deer Creek phase occupation of the adjacent T-2 terrace, there is some potential for the discovery of *in situ* evidence of activities related to it. The evolution of the T-0b fill should also be investigated during any future archaeological work at 14SH101.

Recommendations

Archaeological testing of 27 prehistoric sites in the Clinton Lake Project Area has determined that 25 of the sites are not considered significant in terms of their eligibility for nomination to the National Register of Historic Places. In most cases, these sites consist of shallow, disturbed cultural deposits that lack either sufficient artifact quantity or quality. No cultural features were recognized at any of these sites. Some test units at a few sites, such as 14DO16, 14DO32, 14DO37, 14DO62, 14DO68, and 14DO155 did contain cultural materials below the level of agricultural disturbance. However, the presence of these materials at those depths could be attributed to other forms of disturbance, such as floralturbation, faunalturbation, or pedoturbation.

Two sites, 14DO19 and 14SH101, do contain *in situ* cultural deposits in sufficient quantity and/or quality to warrant their consideration for the National Register. It is suggested that these sites be protected from further disturbance by removing them from agricultural production and planting them in native grasses. The deposits at 14SH101, in particular, are vulnerable to such practices as deep plowing. Feature 1 at that site, while largely intact, had still been damaged in its upper part by plowing. The structure indicated by the daub concentration in Area A at 14DO19 is similarly vulnerable to plowing. Only the deeply buried component in Area C at 14DO19 is safely beyond the reach of agricultural practices. Finally, although only 14DO19 is easily accessible via a county road, it is suggested that both sites be periodically patrolled and inspected for signs of vandalism or "pot-hunting". It is recommended that these steps be taken to protect the important cultural resources present at these sites.

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Appendix 1

CLINTON LAKE ARCHAEOLOGICAL PROJECT: HISTORIC ASSEMBLAGES

Brad Logan

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO15	1	1 (0-10)	DO15860079	wire nail frag.
14DO15	2	1 (0-20)	DO15860182	white stoneware
14DO15	2	1 (0-20)	DO15850183	wire nail frag.
14DO15	4	1 (0-20)	DO15860257	square nail frag.
14DO16	5	1 (0-10)	DO16860156-DO16860158	3 clear glass
14DO16	5	2 (0-20)	DO16860164	1 clear glass
14DO19	3	1 (0-20)	DO19860311-DO19860312	2 .22 cal. rim-fire cartridges
14DO19	5	1 (0-20)	DO19860356	clear bottle glass fragment
14DO19	5	2 (23)	DO19860357	staple
14DO19	7	1 (0-20)	DO19864464	lead bullet
14DO19	11	1 (0-20)	DO19869118	steel ball
14DO35	1	1 (0-10)	DO35860147	wire nail frag.
14DO35	1	1 (0-10)	DO35860148	staple
14DO35	1	2 (10-20)	DO35860343-DO35860344	clear bottle glass
14DO35	1	2 (10-20)	DO35860345	nail fragment
14DO35	1	2 (10-20)	DO35860346-DO35860347	2 pieces of metal
14DO35	2	1 (0-10)	DO35860609	glass bottle top
14DO35	2	1 (0-10)	DO35860610	staple
14DO35	3	1 (0-30)	DO35860957-DO35860958	2 pieces of wire
14DO35	4	1 (0-30)	DO35861384	clear glass frag
14DO35	4	1 (0-30)	DO35861385-DO35861386	2 square nails
14DO35	4	1 (0-30)	DO35861387-DO35861388	2 pieces of wire
14DO35	5	1 (0-25)	DO35861759	.22 cal. cartdge
14DO35	7	1 (0-20)	DO35862603-DO35862615	13 pieces of clinker
14DO35	8	1 (0-20)	DO35863078-DO35863092	15 pieces of clinker
14DO35	8	1 (0-20)	DO35863093-DO35863094	2 pieces of coal
14DO35	9	1 (0-20)	DO35863613-DO35863615	3 pieces water-pipe
14DO35	9	1 (0-20)	DO35863616	clear glass frag
14DO35	9	1 (0-20)	DO35863617	unident. metal
14DO35	10	1 (0-20)	DO35864049	clear glass

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO35	12	1 (0-20)	DO35864358	1 clinker frag.
14DO37	2	1 (0-25)	DO37860131	white chinaware
14DO37	2	1 (0-25)	DO37860132	clear glass frag
14DO37	3	1 (0-40)	DO37860231-DO37860232	2 pieces of clear glass
14DO37	3	1 (0-40)	DO37860233-DO37860236	4 pieces of unidentified metal
14DO37	4	1A (0-20)	DO37860298	white stoneware
14DO37	4	1A (0-20)	DO37860299-DO37860300	2 pieces of unidentified metal
14DO37	4	1B (20-40)	DO37860312	white chinaware
14DO37	4	1B (20-40)	DO37860313	canning lid frag
14DO37	4	1B (20-40)	DO37860314	clear glass frag
14DO37	4	1B (20-40)	DO37860315	top of a screw
14DO37	4	1B (20-40)	DO37860316-DO37860317	2 pieces of brick
14DO37	5	1 (0-25)	DO37860415	wire fragment
14DO39	1	1 (0-10)	DO39860106	clear glass frag
14DO39	1	2 (10-20)	DO39860176	clear glass frag
14DO40	1	1 (0-20)	DO40860038	porcelain frag
14DO40	1	1 (0-20)	DO40860039	white chinaware-rim fragment
14DO40	1	1 (0-20)	DO40860040-DO40860048	9 pieces of white ware
14DO40	1	1 (0-20)	DO40860049, DO40860051	2 pieces of beige stoneware
14DO40	1	1 (0-20)	DO40860050, DO40860052-DO40860057	7 pieces of brown stoneware
14DO40	1	1 (0-20)	DO40860058	brown stoneware-rim fragment
14DO40	1	1 (0-20)	DO40860059	white ware
14DO40	1	1 (0-20)	DO40860060-DO40860064	5 pieces of milk glass, 1 with letters N JAR
14DO40	1	1 (0-20)	DO40860066	green glass frag
14DO40	1	1 (0-20)	DO40860067-DO40860072	6 pieces of frosted glass
14DO40	1	1 (0-20)	DO40860065, DO40860073-DO40860109	38 pieces of clear glass
14DO40	1	1 (0-20)	DO40860110	wire nail frag.
14DO40	1	1 (0-20)	DO40860111	wire nail frag.
14DO40	1	1 (0-20)	DO40860112	wire nail frag.
14DO40	1	1 (0-20)	DO40860113	staple
14DO40	1	1 (0-20)	DO40860114	wire nail
14DO40	1	1 (0-20)	DO40860115	square nail
14DO40	1	1 (0-20)	DO40860116-DO40860117	2 pieces of unidentified metal

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO40	1	1 (0-20)	DO40860118-DO40860120	3 pieces of brick
14DO40	1	1 (0-20)	DO40860121	plastic fragment
14DO40	1	1 (0-20)	DO40860122	harness frag.?
14DO40	1	1 (0-20)	DO40860123	vulcanized rubber
14DO40	2	1 (0-20)	DO40860146	chinaware rim
14DO40	2	1 (0-20)	DO40860147	white ware base
14DO40	2	1 (0-20)	DO40860148-DO40860152	7 pieces of salt glazed, white
14DO40	2	1 (0-20)	DO40860154, DO40860156	stoneware
14DO40	2	1 (0-20)	DO40860153	chinaware rim
14DO40	2	1 (0-20)	DO40860155	chinaware base
14DO40	2	1 (0-20)	DO40860157-DO40860161	6 pieces of brown stoneware
14DO40	2	1 (0-20)	DO40860162	beige stoneware
14DO40	2	1 (0-20)	DO40860164, DO40860168	2 pieces of amber glass
14DO40	2	1 (0-20)	DO40860165-DO40860167, DO40860169-DO40860180	15 pieces of clear glass
14DO40	2	1 (0-20)	DO40860181-DO40860186	6 pieces of milk glass
14DO40	2	1 (0-20)	DO40860187	green glass frag
14DO40	2	1 (0-20)	DO40860188	frosted glass
14DO40	2	1 (0-20)	DO40860189-DO40860194	6 pieces of clear glass
14DO40	2	1 (0-20)	DO40860195	unident. metal
14DO40	2	1 (0-20)	DO40860196	flat metal frag.
14DO40	2	1 (0-20)	DO40860197	wire nail
14DO40	2	1 (0-20)	DO40860198	wire nail
14DO40	2	1 (0-20)	DO40860199-DO40860200	2 pieces of leather
14DO40	2	1 (0-20)	DO40860201	2-hole button of vulcanized rubber
14DO40	2	1 (0-20)	DO40860250-DO40860252	3 pieces of unidentified metal
14DO40	2	1 (0-20/25)	DO40860253-DO40860263	11 pieces of clay pigeon
14DO59	3	1 (0-10)	DO59860033	salt-glazed, white ware
14DO62	2	1 (0-20)	DO62860102-DO62860106	5 pieces of clinker
14DO68	1	1 (0-20)	DO68860034-DO68860036	3 pieces of white ware
14DO68	3	2 (20-30)	DO68860124-DO68860125	2 pieces of white stoneware
14DO68	4	1 (0-20)	DO68860161	white stoneware

Site No.	Unit No.	Level (cm)	Catalog No.	Description
14DO68	4	1 (0-20)	DO68860162	brown stoneware
14DO68	4	2 (20-30)	DO68860169- DO68860170	2 pieces of white stoneware
14DO138	2	1 (0-10)	DO138860255	clear glass frag
14DO138	3	1 (0-10)	DO138860445- DO138860447	3 pieces of clear glass
14DO142	1	1 (0-20)	DO142860108	clear glass frag
14DO142	1	1 (0-20)	DO142860149	clay pigeon frag
14DO142	4	1 (0-20)	DO142860156- DO142860158	3 pieces of clay pigeon
14DO153	3	1 (0-20)	DO153860001- DO152860002	2 pieces of brown glass
14DO155	3	1 (0-20)	DO155860499	aqua glass
14DO157	2	2 (10-20)	DO157860195	asphalt roofing material frag.
14DO309	4	1 (0-10)	DO309860068	lead sinker
14DO309	8	1 (0-10)	DO309860278	staple
14SH101	1	1 (0-20)	SH101860020	metal hook

Appendix 2

RADIOCARBON DATES FROM CLINTON LAKE PROJECT AREA

Brad Logan

14DO19

Feature 2: 970±60 B.P.: A.D. 980 (Beta-19873)
Feature 2: 1075±65 B.P.: A.D. 875 (UGa-4705)

Average: 1018.3±44.1 B.P.

Calibrated Ages: A.D. 1000, 1015 (Stuiver and Becker 1986)
B.P. 950, 935

Calibrated A.D/B.C. (cal B.P.) age ranges:

One sigma: A.D. 983-1025 (967-925)

Two sigma: A.D. 900-919 (1050-1031)
943-1044 (1007-906)
1090-1122 (860-828)
1139-1152 (811-798)

Intercepts and Calibrated Maximum Ranges:

One sigma: A.D. 983 (1000, 1015) 1025
B.P. 967 (950, 935) 925

Two sigma: A.D. 900 (1000, 1015) 1152
B.P. 1050 (950, 935) 798

14DO32

Feature 5: 1090±50 B.P.: A.D. 860 (Beta-18611)

Calibrated Age: A.D. 979 (Stuiver and Becker 1986)
B.P. 971

Calibrated A.D./B.C. (B.P.) Age Ranges:

One sigma: A.D. 891-996 (1059-954)

Two sigma: A.D. 780-790 (1170-1160) 803-825 (1147-1125)
825-842 (1125-1108) 850-1020 (1100-930)

Intercepts and Calibrated Maximum Ranges:

One sigma: A.D. 891 (979) 996
B.P. 1059 (971) 954

Two sigma: A.D. 780 (979) 1020
B.P. 1170 (971) 930

14DO32

Feature 6: 950±150 B.P.: A.D. 1000 (UGa-4704)

Calibrated Age: A.D. 1033, 1143, 1147 (Stuiver and Becker 1986)
B.P. 917, 807, 803

Calibrated A.D./B.C. (B.P.) Age Ranges:

One sigma: A.D. 905-915 (1045-1035) 980-1230 (970-720)
1241-1256 (709-694)

Two sigma: A.D. 733-737 (1217-1213) 770-1300 (1180-650)
1374-1376 (576-574)

Intercepts and Calibrated Maximum Ranges:

One sigma: A.D. 905 (1033, 1143, 1147) 1256
B.P. 1045 (917, 807, 803) 694

Two sigma: A.D. 733 (1033, 1143, 1147) 1376
B.P. 1217 (917, 807, 803) 574

14DO153

Trench 1: 2930±80 B.P.: 980 B.C. (Tx-5670)

14DO154

Feature 1: 840±150 B.P.: A.D. 1110 (Gx-6487)
Feature 1: 1040±150 B.P.: A.D. 910 (Gx-6488)

Average: 940.0±106.1 B.P.

Calibrated Age: A.D. 1037, 1142, 1149 (Stuiver and Becker 1986)
B.P. 913, 808, 801

Calibrated A.D./B.C. (B.P.) Age Ranges:

One sigma: A.D. 990-1210 (960-740)

Two sigma: A.D. 890-1280 (1060-670)

Intercepts and Calibrated Maximum Ranges:

One sigma: A.D. 990 (1037, 1142, 1149) 1210
B.P. 960 (913, 808, 801) 740

Two sigma: A.D. 890 (1037, 1142, 1149) 1280
B.P. 1060 (913, 808, 801) 670

14SH101

Feature 1: 1130±60 B.P.: A.D. 820 (Beta-18609)

Calibrated Age: A.D. 895, 933, 939
B.P. 1055, 1028, 1011

Calibrated A.D./B.C. (B.P.) Age Ranges:

One sigma: A.D. 781-790 (1169-1160), 804-823 (1146-1127)
827-841 (1123-1109) 858-984 (1092-966)

Two sigma: A.D. 729-743 (1221-1207) 770-1000 (1180-950)
1008-1019 (942-931)

Intercepts and Calibrated Age Ranges:

One sigma: A.D. 781 (895, 922, 939) 984
B.P. 1169 (1055, 1028, 1011) 966

Two sigma: A.D. 729 (895, 922, 939) 1019
B.P. 1221 (1955, 1028, 1011) 931

Feature 1: 1460±100 B.P.: A.D. 490 (Beta-18610)
Feature 1: 1400±100 B.P.: A.D. 550 (Tx-5667)

Average: 1430.0±70.7 B.P.

Calibrated Age: A.D. 639
B.P. 1311

Calibrated A.D./B.C. (B.P.) Age Ranges:

One sigma: A.D. 556-658 (1394-1292)

Two sigma: A.D. 431-520 (1519-1430) 530-690 (1420-1260)
703-707 (1247-1243) 751-762 (1199-1188)

Intercepts and Calibrated Maximum Ranges:

One sigma: A.D. 556 (639) 658
B.P. 1394 (1311) 1292

Two sigma: A.D. 431 (639) 762
B.P. 1519 (1311) 1188

Trench 1: 15350±390 B.P.: 13,400 B.C. (Tx-5668)
Trench 3: 1240±90 B.P.: A.D. 710 (Tx-5669)

Appendix 3

FREQUENCY OF LITHIC RAW MATERIAL TYPES

Lauren W. Ritterbush

The following tables present frequencies of lithic material types as identified in the assemblage of debitage from 24 prehistoric sites, investigated as part of the Clinton Lake Archaeological Project. No debitage was recovered from 14DO153 and 14SH102. A table is given for each site providing frequencies of Plattsmouth, Toronto, white, exotic, Winterset, and indeterminate cherts and their heat modified forms (see Chapter 7). Included in the analysis of lithic material types were all forms of debitage: flakes, chips, blades, bifacial resharpening flakes, potlids, cores, tested pieces, and shatter, and retouched/utilized forms of the same. Symbols used in the tables are defined as follows:

xu	excavation unit
BH	backhoe (trench)
FS	surface find spot
l	level (of feature)
P-	Plattsmouth chert with no heat modification
PH	heat modified Plattsmouth chert
T-	Toronto chert with no heat modification
TH	heat modified Toronto chert
Wh-	unidentifiable white chert with no heat modification
WhH	heat modified unidentifiable white cherts
O-	other or exotic (non-local) materials with no heat modification
OH	heat modified other or exotic (non-local) materials
Wi-	Winterset chert with no heat modification
WiH	heat modified Winterset chert
I-	indeterminate or unknown materials with no heat modification
IH	heat modified indeterminate or unknown materials

14D015

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	32	29	1	1	1	0	0	0	0	0	1	0
xu1 level 2	7	26	1	1	1	0	0	0	0	0	0	0
xu2 level 1	28	18	4	3	0	0	0	0	0	0	3	0
xu2 level 2	2	2	0	0	0	0	0	0	0	0	0	0
xu3 level 1	7	6	0	0	0	0	0	0	0	0	1	0
xu4 level 1	21	13	2	1	0	0	1	0	0	0	2	1
TOTALS	97	94	8	6	2	0	1	0	0	0	7	1

14D016

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	2	3	0	1	0	0	0	0	0	0	1	0
xu1 level 2	11	2	5	3	0	0	0	0	0	0	1	3
xu1 level 3	7	3	1	1	0	0	0	1	0	0	0	1
xu1 level 4	5	1	0	0	0	0	1	0	0	0	1	0
xu2 level 1	4	1	0	0	0	0	1	0	0	0	0	0
xu3 level 1	8	2	4	2	0	0	1	0	0	0	0	2
xu3 level 2	1	1	0	0	0	0	0	0	0	0	0	1
xu4 level 1	15	2	0	0	0	0	0	0	0	0	1	0
xu4 level 2	13	1	0	0	0	0	0	0	0	0	0	0
xu4 level 3	4	0	0	0	0	0	0	0	0	0	0	0
xu4 level 4	2	0	0	0	0	0	0	0	0	0	0	0
xu5 level 1	3	1	1	1	1	0	0	0	0	0	0	2
xu5 level 2	2	1	0	0	1	0	0	1	0	0	1	0
xu5 level 3	2	0	0	0	1	0	0	0	0	0	0	1
xu5 level 4	1	1	0	1	1	0	0	0	0	0	0	0
xu5 level 5	0	1	0	0	1	0	0	1	0	0	0	0
xu6 level 1	6	8	0	0	2	0	0	0	0	0	1	2
xu6 level 2	9	2	0	4	0	0	0	0	0	0	1	1
xu6 level 3	2	5	1	1	0	0	0	0	0	0	0	0
xu6 level 4	1	1	0	0	0	0	0	0	0	0	0	0
TOTALS	98	36	12	14	7	0	3	3	0	0	6	13

14DO19

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
Area B:												
xu1 level 1	21	11	1	2	0	0	1	0	0	0	0	0
xu2 level 1	18	20	1	0	0	0	0	0	0	0	0	0
xu3 level 1	12	16	1	0	0	0	0	0	0	0	1	0
xu4 level 1	14	11	0	0	1	0	0	0	0	0	0	1
xu4 level 2	1	1	0	0	0	0	0	0	0	0	0	0
Area A:												
xu5 level 1	0	1	0	0	0	0	0	0	0	0	0	0
xu6 level 1	2	0	0	0	0	0	0	0	0	0	1	0
xu6 level 2	0	1	0	0	0	0	0	0	0	0	0	0
xu6 level 3	0	0	0	0	0	0	0	0	0	0	0	1
xu7 level 1	16	15	3	1	3	0	0	0	0	0	3	4
xu7 level 2	1	3	0	0	1	2	0	0	0	0	0	2
xu7 level 3	0	1	0	0	0	0	0	1	0	0	0	0
xu8 level 1	0	1	0	0	0	0	0	0	0	0	0	0
xu8 level 2	0	3	0	1	0	0	0	0	0	0	0	0
Area C:												
xu9 level 1	0	1	0	0	0	0	0	0	0	0	0	0
xu10level 1	0	1	0	0	0	0	0	0	0	0	0	0
xu11level 2	0	1	1	0	0	0	0	0	0	0	0	0
xu11level 3	0	0	1	0	0	0	0	0	0	0	0	0
BH trench	0	1	2	1	0	0	0	0	0	0	0	0
TOTALS	85	88	10	5	5	2	1	1	0	0	5	8

14DO32

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	15	27	8	6	2	1	1	0	0	0	0	2
xu1 level 2	2	1	0	0	0	1	0	0	0	0	0	0
xu2 level 1	35	34	8	14	3	1	0	0	0	0	8	5
xu3 level 1	83	101	38	36	4	0	4	1	0	0	10	14
xu3 level 2	0	2	2	0	0	0	0	0	0	0	1	1
xu4 level 1	81	79	28	21	0	0	2	2	0	0	10	4
xu5 level 1	58	54	18	24	1	1	0	0	0	0	0	4
xu6 level 1	79	64	55	35	1	0	6	0	0	0	2	10
xu7 level 1	83	86	54	57	10	0	0	0	0	0	9	11
TOTALS	436	448	211	193	21	4	13	3	0	0	40	51

14DO35

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	60	47	11	15	1	0	0	1	0	0	0	1
xu1 level 2	72	74	9	23	2	0	0	0	0	0	2	8
xu1 level 3	60	37	15	13	0	0	0	0	0	0	3	0
xu2 level 1	57	38	5	19	5	0	0	0	0	0	0	2
xu2 level 2	29	25	4	7	0	1	0	0	0	0	0	0
xu2 level 3	25	11	3	3	0	0	0	0	0	0	0	0
xu2 auger	0	0	0	0	0	0	0	0	0	0	1	0
xu3 level 1	117	63	16	30	1	0	0	0	0	0	0	1
xu3 level 2	5	6	3	2	0	0	0	0	0	0	0	0
xu4 level 1	201	87	46	35	3	0	0	0	0	0	2	0
xu5 level 1	147	109	39	42	0	0	0	0	0	0	0	1
xu6 level 1	143	86	35	36	1	2	0	1	0	0	1	0
xu6 level 2	1	0	1	0	0	0	0	0	0	0	0	0
xu7 level 1	185	144	84	77	3	0	1	0	0	0	3	2
xu8 level 1	165	155	62	68	1	0	0	0	0	0	2	2
xu8 level 2	2	2	2	0	0	0	0	0	0	0	0	0
xu9 level 1	254	128	58	49	0	0	0	0	0	0	3	5
xu9 level 2	5	1	1	4	0	0	0	0	0	0	0	0
xu10level 1	213	97	55	47	2	0	0	2	0	0	1	1
xu11level 1	81	53	27	28	0	0	0	1	0	0	0	0
xu12level 1	37	22	21	16	0	0	0	1	0	0	1	0
xu12level 2	1	0	0	0	0	0	0	0	0	0	0	0
TOTALS	1860	1185	497	514	19	3	1	6	0	0	19	23

14DO37

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wh-	WhH	I-	IH
xu2 level 1	66	37	7	5	1	0	0	2	0	0	4	1
xu2 level 2	4	2	2	0	0	0	0	0	0	0	1	0
xu3 level 1	36	27	3	10	1	0	0	0	0	0	0	1
xu3 level 2	3	1	0	1	0	0	0	0	0	0	0	0
xu4 level1A	21	13	5	6	0	0	0	1	0	0	1	2
xu4 level1B	7	2	1	0	0	0	0	0	0	0	1	0
xu5 level 1	45	29	6	5	0	0	0	3	0	0	3	1
xu5 level 2	4	0	0	0	0	0	0	0	0	0	0	0
xu6 level 1	36	14	5	7	0	0	0	0	0	0	2	1
xu7 level 1	20	6	2	1	0	0	0	0	0	0	3	1
xu8 level 1	19	9	2	5	0	0	0	0	0	0	0	1
TOTALS	261	140	33	40	2	0	0	6	0	0	15	8

14DO39

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	5	3	54	16	1	0	0	0	0	0	0	1
xu1 level 2	4	1	45	11	0	0	0	0	0	0	0	1
xu1 level 3	0	0	14	3	0	0	0	0	0	0	0	0
xu1 level 4	0	0	2	0	0	0	0	0	0	0	0	0
xu1 level 5	1	1	0	0	0	0	0	0	0	0	0	0
xu2 level 1	3	0	50	16	0	0	1	0	0	0	0	0
xu2 level 2	3	0	32	5	0	0	0	0	0	0	2	0
xu2 level 3	0	1	19	7	0	0	0	0	0	0	1	1
xu2 level 4	1	1	0	0	0	0	0	0	0	0	0	0
xu3 level 1	9	2	1	0	0	0	0	0	0	0	0	0
xu3 level 2	11	1	0	0	0	0	0	0	0	0	0	0
xu3 level 3	1	0	0	0	0	0	0	0	0	0	0	0
xu4 level 2	0	0	2	0	0	0	0	0	0	0	0	0
TOTALS	38	10	219	58	1	0	1	0	0	0	3	3

14DO40

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	12	7	6	3	0	0	0	0	0	0	1	1
xu2 level 1	6	0	10	6	0	0	0	0	0	0	0	0
xu3 level 1	18	10	3	3	0	0	0	0	0	0	0	0
xu3 level 2	0	0	0	0	0	0	1	0	0	0	0	0
xu4 level 1	41	2	0	0	0	0	0	0	0	0	0	0
xu4 level 2	11	0	0	0	0	0	1	0	0	0	0	0
xu5 level 1	18	9	9	9	0	0	0	1	0	0	0	1
xu5 level 2	4	1	0	0	0	0	0	0	0	0	0	0
TOTALS	110	29	28	21	0	0	2	1	0	0	1	2

14DO59

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	1	0	0	0	0	0	0	0	0	0	0	0
xu1 level 2	1	2	0	0	0	0	0	0	0	0	0	0
xu2 level 1	1	0	2	0	0	0	0	0	0	0	0	0
xu3 level 1	0	1	1	1	2	0	0	0	0	0	0	0
xu3 level 2	0	0	1	0	0	0	0	0	0	0	0	0
xu3 level 3	0	0	0	0	0	0	0	1	0	0	0	0
xu3 level 4	0	0	0	1	0	0	0	0	0	0	0	0
xu4 level 1	1	0	0	1	0	0	0	0	0	0	0	0
xu4 level 2	0	1	0	0	0	0	0	0	0	0	0	0
TOTALS	4	4	4	3	2	0	0	1	0	0	0	0

14D061

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	3	1	0	0	0	0	0	0	0	0	0	0
xu2 level 2	1	0	0	0	0	0	0	0	0	0	0	0
xu2 level 3	1	1	0	0	0	0	0	0	0	0	0	0
xu3 level 1	1	0	0	0	0	0	0	0	0	0	0	0
xu3 level 2	2	0	0	0	0	0	0	0	0	0	0	0
xu4 level 2	2	0	0	0	0	0	0	0	0	0	0	0
TOTALS	10	2	0	0	0	0	0	0	0	0	0	0

14D062

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	29	19	2	1	1	0	0	0	0	0	0	0
xu1 level 2	7	4	0	2	0	0	0	1	0	0	0	0
xu1 level 3	2	1	0	0	0	0	0	0	0	0	0	0
xu2 level 1	2	0	0	0	0	0	0	0	0	0	0	0
xu3 level 1	15	8	0	0	1	0	0	0	0	0	0	0
xu3 level 2	0	1	0	0	0	0	0	0	0	0	0	0
xu4 level 1	9	2	2	1	0	0	0	0	0	0	0	0
xu5 level 1	8	6	1	0	2	0	0	0	0	0	1	0
TOTALS	72	41	5	4	4	0	0	1	0	0	1	0

14D068

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	10	8	7	4	0	0	0	0	0	0	1	0
xu1 level 2	0	1	1	1	1	0	0	0	1	0	0	0
xu1 level 3	1	0	1	1	0	0	0	0	0	0	0	0
xu1 level 4	2	0	0	0	0	0	0	0	0	0	0	0
xu2 level 1	4	5	13	11	0	0	0	0	0	0	0	1
xu2 level 2	7	0	1	1	0	0	0	0	0	0	0	0
xu2 level 4	1	0	1	1	0	0	0	0	0	0	0	0
xu3 level 1	1	0	0	1	0	0	0	0	0	0	0	0
xu3 level 2	2	1	3	5	0	0	0	0	0	0	0	0
xu3 level 3	0	0	0	1	0	0	0	0	0	0	0	0
xu4 level 1	4	5	5	6	0	0	0	0	0	0	0	0
xu4 level 2	3	1	2	1	0	0	0	0	0	0	0	0
xu4 level 3	0	1	0	1	0	0	0	0	0	0	0	0
TOTALS	35	22	34	34	1	0	0	0	1	0	1	1

14D075

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu2 level 1	1	2	0	0	0	0	0	0	0	0	0	0
xu2 level 2	1	0	0	0	1	0	0	0	0	0	0	0
xu2 level 3	0	1	0	0	0	0	0	0	0	0	0	0
xu2 level 4	1	1	0	0	0	0	0	0	0	0	0	0
xu2 level 5	0	1	0	0	0	0	0	0	0	0	0	0
xu3 level 3	0	1	0	0	0	0	0	0	0	0	0	0
TOTALS	3	6	0	0	1	0	0	0	0	0	0	0

14D0137

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	3	0	6	4	2	0	0	0	0	0	0	1
xu1 level 2	1	1	1	1	0	0	0	0	0	0	0	0
xu2 level 1	6	4	11	15	0	0	0	0	0	0	1	2
xu2 level 2	1	0	3	6	0	0	0	0	0	0	0	0
xu2 level 3	2	0	0	0	0	0	0	0	0	0	0	0
xu3 level 1	7	8	14	16	0	0	0	0	0	0	0	0
xu3 level 2	3	1	3	4	0	0	0	0	0	0	0	0
xu4 level 1	4	5	7	8	0	0	0	0	0	0	0	0
xu4 level 2	2	2	9	11	2	0	0	0	0	0	1	1
xu4 level 3	2	1	2	5	0	0	0	0	0	0	0	1
xu5 level 1	29	16	103	64	2	0	0	1	0	0	0	1
xu6 level 1	13	2	22	28	0	0	0	0	0	0	2	0
xu6 level 2	11	10	29	33	2	0	0	0	0	0	0	1
xu7 level 1	6	3	10	19	0	0	0	0	0	0	0	0
xu7 level 2	2	1	1	2	0	0	0	0	0	0	0	0
xu8 level 1	7	1	11	16	0	0	0	0	0	0	0	0
xu8 level 2	7	2	11	11	0	0	0	0	0	0	0	0
xu8 level 3	4	1	6	10	0	0	0	0	0	0	0	0
xu9 level 1	0	0	1	0	0	0	0	0	0	0	0	0
xu10level 1	2	0	1	0	0	0	0	0	0	0	0	0
xu10level 2	1	0	0	0	0	0	0	0	0	0	0	0
xu11level 1	10	1	3	5	1	0	0	0	0	0	1	0
xu11level 2	3	2	0	3	0	0	0	0	0	0	0	0
xu12level 1	8	2	2	4	0	0	0	0	0	0	1	0
xu12level 2	7	4	1	0	0	0	0	0	0	0	0	0
BH trench 1	0	0	1	0	0	0	0	0	0	0	0	0
TOTALS	141	67	258	265	9	0	0	1	0	0	6	7

14DO138

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	69	28	0	0	0	0	0	0	0	0	1	0
xu1 level 2	62	25	3	2	0	0	0	0	0	0	1	0
xu1 level 3	16	1	0	1	0	0	0	0	0	0	0	1
xu2 level 1	22	7	1	3	0	0	0	0	0	0	0	0
xu2 level 2	7	5	0	0	0	0	0	0	0	0	0	0
xu3 level 1	89	54	14	7	0	0	1	0	0	0	2	0
xu3 level 2	118	53	10	6	0	0	1	0	0	0	3	0
xu3 level 3	2	2	3	0	0	0	0	0	0	0	0	0
xu4 level 1	18	8	3	0	0	0	0	0	0	0	0	0
xu4 level 2	5	5	0	0	0	0	0	0	0	0	0	0
TOTALS	408	188	34	19	0	0	2	0	0	0	7	1

14DO141

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	24	2	0	0	0	0	0	0	0	0	0	0
xu1 level 2	2	1	0	0	0	0	0	0	0	0	0	0
xu2 level 1	5	3	0	1	0	0	0	0	0	0	0	0
xu3 level 1	16	6	1	0	0	0	0	0	0	0	1	1
xu4 level 1	0	0	1	0	0	0	0	0	0	0	0	0
xu5 level 1	26	5	2	0	0	0	0	0	0	0	0	0
xu5 level 2	3	0	0	0	0	0	0	0	0	0	0	0
TOTALS	76	17	4	1	0	0	0	0	0	0	1	1

14DO142

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	26	15	0	0	0	0	0	0	0	0	0	0
xu1 level 2	2	0	0	0	0	0	0	0	0	0	0	0
xu2 level 1	6	4	0	0	0	0	0	0	0	0	0	0
xu2 level 2	5	1	0	0	0	0	0	0	0	0	0	0
xu3 level 1	1	3	0	0	0	0	0	0	0	0	0	1
xu4 level 1	3	1	0	0	0	0	0	0	0	0	0	0
xu4 level 2	0	1	0	0	0	0	0	0	0	0	0	0
TOTALS	43	25	0	0	0	0	0	0	0	0	0	1

14DO155

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
FS #1	0	1	0	0	0	0	0	0	0	0	0	0
FS #5	0	1	0	0	0	0	0	0	0	0	0	0
xu1 level 2	9	4	3	1	0	0	0	0	0	0	0	0
xu1 level 3	35	6	5	9	0	0	0	0	0	0	1	1
xu1 level 4	36	16	24	8	0	0	0	0	0	0	0	1
xu2 level 1	97	39	77	38	6	0	1	0	0	0	2	2
xu2 level 2	7	4	5	1	1	0	0	0	0	0	0	0
xu3 level 1	14	5	4	4	1	0	0	0	0	0	3	0
xu4 level 1	46	15	21	7	4	0	2	0	0	0	2	2
xu4 level 2	2	0	0	0	1	0	0	0	0	0	0	0
xu5 level 1	13	8	8	2	1	0	0	0	0	0	0	1
xu5 level 2	1	1	0	0	1	1	0	0	0	0	0	0
TOTALS	260	100	147	70	15	1	3	0	0	0	8	7

14DO157

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	23	11	0	0	0	0	0	0	0	0	0	0
xu1 level 2	42	15	2	0	0	0	0	0	0	0	0	0
xu2 level 1	20	11	1	0	0	0	0	0	0	0	0	0
xu2 level 2	30	15	1	1	0	0	1	0	0	0	0	0
xu3 level 1	54	12	0	1	0	0	0	0	0	0	0	0
xu3 level 2	19	8	1	0	0	0	0	0	0	0	0	0
xu4 level 1	10	4	1	0	0	0	0	0	0	0	0	0
xu4 level 2	57	15	0	0	1	0	0	0	0	0	0	0
xu4 level 3	11	1	0	0	0	0	0	0	0	0	0	0
TOTALS	266	92	6	2	1	0	1	0	0	0	0	0

continued....

14DO309

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	5	0	1	3	0	0	0	0	0	0	0	0
xu1 level 2	4	3	1	1	0	0	0	0	0	0	0	0
xu1 level 3	0	0	0	1	0	0	0	0	0	0	0	0
xu2 level 1	2	0	0	0	0	0	0	0	0	0	0	0
xu2 level 2	0	0	0	1	0	0	0	0	0	0	0	0
xu3 level 1	11	5	1	3	0	0	0	0	0	0	0	0
xu4 level 1	18	2	1	1	0	0	0	0	0	0	0	1
xu4 level 2	9	3	1	4	0	0	0	0	0	0	1	1
xu5 level 1	8	4	0	0	0	0	0	0	0	0	0	0
xu5 level 2	9	0	0	0	0	0	0	0	0	0	0	0
xu6 level 1	37	7	1	0	0	0	0	0	0	0	0	0
xu6 level 2	8	1	1	0	0	0	0	0	0	0	0	0
xu7 level 1	14	8	0	0	0	0	0	0	0	0	0	0
xu7 level 2	13	2	1	2	0	0	0	1	0	0	0	1
xu7 level 3	5	0	0	0	0	0	0	0	0	0	0	0
xu7 level 4	3	3	0	1	0	0	0	0	0	0	0	0
xu8 level 1	1	3	0	0	0	0	0	1	0	0	0	0
xu8 level 2	6	1	1	1	0	0	0	0	0	0	0	0
xu8 level 3	10	2	0	1	0	0	0	0	0	0	0	0
xu9 level 1	5	3	0	1	0	0	0	0	0	0	0	0
xu9 level 2	1	0	0	0	0	0	0	0	0	0	0	0
xu10level 1	2	0	0	0	0	0	0	0	0	0	0	0
xu10level 2	5	0	0	0	0	0	0	0	0	0	0	0
xu11level 1	1	1	0	1	0	0	0	0	0	0	0	0
xu11level 2	4	0	0	0	0	0	0	0	0	0	0	0
xu11level 3	2	2	0	0	0	0	0	0	0	0	0	0
xu11level 4	4	0	0	2	0	0	0	0	0	0	0	0
xu12level 1	4	2	0	0	0	0	0	0	0	0	0	0
xu12level 2	7	1	0	0	1	0	0	0	0	0	1	0
xu12level 3	4	0	0	0	1	0	0	0	0	0	0	0
TOTALS	202	53	9	23	2	0	0	2	0	0	2	3

14SH5

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	6	2	1	0	0	0	0	0	0	0	5	1
xu2 level 1	0	4	0	2	0	0	0	0	0	0	0	0
xu3 level 1	7	3	6	1	0	0	0	0	0	0	0	0
xu3 level 2	1	2	4	0	0	0	0	0	0	0	0	0
xu4 level 1	26	9	5	0	0	0	1	0	0	0	3	0
xu4 level 2	3	0	1	0	0	0	0	0	0	0	3	0
TOTALS	43	20	17	3	0	0	1	0	0	0	11	1

14SH6

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	1	1	0	0	0	0	0	0	0	0	0	0
xu2 level 1	0	0	0	2	0	0	0	0	0	0	0	0
xu2 level 2	1	0	0	0	0	0	0	0	0	0	1	0
xu2 level 3	0	0	0	0	0	0	0	0	0	0	1	0
xu3 level 1	5	2	0	3	0	0	0	0	0	0	0	0
xu4 level 1	3	4	0	0	0	0	0	0	0	0	1	0
TOTALS	10	7	0	5	0	0	0	0	0	0	3	0

14SH101

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	6	0	0	1	0	0	1	0	0	0	0	0
xu2 level 1	22	19	4	1	2	0	1	2	0	0	0	0
xu2 level 2	12	4	1	3	0	0	0	0	0	0	1	1
xu3 level 1	21	18	8	6	1	0	0	1	0	0	1	1
xu3 level 2	2	3	2	2	0	0	0	0	0	0	0	2
xu3 level 3	3	0	0	1	0	0	0	0	0	0	0	0
Feature1/11	16	25	5	7	0	1	1	1	0	0	1	3
Feature1/12	11	12	1	2	0	0	0	0	0	0	0	0
xu4 level 1	34	9	5	1	0	0	1	0	0	0	0	0
xu4 level 2	2	1	0	0	0	0	0	0	0	0	1	0
xu5 level 1	45	24	13	8	0	0	0	0	0	0	1	0
xu5 level 2	56	14	14	8	1	0	1	0	0	0	0	0
xu5 level 3	0	0	0	1	0	0	2	0	0	0	0	0
xu6 level 1	53	19	10	17	0	0	2	0	0	0	0	1
xu6 level 2	18	6	3	2	0	0	0	0	0	0	0	0
xu7 level 1	71	22	35	13	3	0	5	0	0	0	6	2
xu7 level 2	19	5	37	13	0	0	6	0	0	0	4	1
xu7 level 3	6	1	0	2	0	0	0	0	0	0	0	0
xu8 level 1	62	31	59	16	2	0	11	1	0	1	4	2
xu8 level 2	11	8	8	1	1	0	1	0	0	0	2	0
xu9 level 1	5	1	3	1	0	0	0	0	0	0	2	0
xu10level 1	2	0	0	1	0	0	0	0	0	0	0	0
TOTALS	477	222	208	107	10	1	32	5	0	1	23	13

14SH103

	P-	PH	T-	TH	Wh-	WhH	O-	OH	Wi-	WiH	I-	IH
xu1 level 1	1	7	3	3	0	0	1	0	0	0	0	0
xu1 level 2	0	0	0	2	0	0	0	0	0	0	0	0
xu2 level 1	10	6	1	6	1	0	0	1	0	0	1	1
xu3 level 1	8	3	5	2	2	0	3	0	0	0	0	1
xu3 level 2	4	5	7	4	0	0	3	0	0	0	0	0
xu4 level 1	2	0	2	1	0	0	4	0	0	0	0	0
TOTALS	25	21	18	18	3	0	11	1	0	0	1	2

Appendix 4

GLOSSARY

Argillic- a mineral soil horizon characterized by the illuvial (see illuviation below) accumulation of layer-lattice silicate clays.

Artifact- any object manufactured or modified by man.

Assemblage- all the industries, or a particular type of industry, at one site.

Bilobate- a phytolith with a lobe at both ends of a shaft, i.e., like a dumbbell.

Biogenic- generated from living organisms.

Bulliform cells- keystone shaped cells of the upper surface of a leaf, usually occuring in bands between and parallel with the veins.

Calibration- an adjustment of the radiocarbon dating "clock" that accounts for the variation in the amount of C-14 in the atmosphere through time.

Cf.- compare

Chloridoids- abb. of Chloridoideae, a subfamily of grasses adapted to areas with warm temperatures where available soil moisture is low.

Complex- refers to an archaeological manifestation without being committal to any particular taxonomic designation, such as a focus or phase.

Component- the manifestation of a given archaeological focus at a specific site.

Crotovina- also spelled krotovina, a former animal burrow in one soil horizon that has been filled with organic matter or material from another horizon.

Culture- similar assemblages found at several sites, defined in a context of time and space.

Datum- a reference point on an archaeological site, normally surveyed onto a large-scale map, and used as a base point for all measurements on the site.

Debitage- the waste material (chips and flakes) generated by the production of chipped-stone tools.

Delisle maps- refers to the maps produced by Guillaume De l'Isle (generally spelled Delisle), a noted French cartographer, in 1703 (Carte du Mexique et de la Floride ...) and 1718 (Carte de la Louisiane et du Cours du Mississipi ...). These were the most accurate depictions of the locations of the physical features and indigenous peoples of North America during the early 18th century.

Diagnostic artifact- an item representative of a particular culture or time period.

Dicot- abb. of dicotyledon, any of a great subclass of seed plants (Angiospermae) bearing two cotyledons (seed leaves) in the embryo. Dicots include the majority of deciduous trees, shrubs and herbs.

Dicotyledonous- of or pertaining to dicotyledon (see dicot above).

Endosteum- the thin, vascular membrane lining the medullary cavity (that which contains the marrow) of a bone.

Feature- the location of specific activities (e.g., hearths, storage pits, petroglyphs, burials) that are recognized in the field.

Flotation- water separation of heavy soils from light plant and animal remains.

Fluvial- pertaining to, found in, or formed by a stream.

Focus- from the old Midwestern (or McKern) Taxonomic System of archaeological complexes; approximately equivalent to a phase in the Willey and Phillips system.

Holocene- the Recent epoch of the Quaternary era; the last 10,000 years of geologic time.

Illuviation- the process, mechanical or chemical, by which material is added to the topsoil of an area.

Industry- all artifacts of one particular kind (viz., bone, stone, or ceramic) found at one site, made at the same time, by the same population.

Interfluve- the high land between two streams belonging to the same drainage system.

Lithic- stone, either groundstone or chipped stone.

Macrofloral- all plant remains that can be seen with the unaided eye but that are usually identified with a microscope.

Mollic epipedon- a surface horizon of mineral soil that is dark colored and relatively thick, contains at least 0.58% organic carbon, is not massive and hard or very hard when dry, has a base saturation of more than 50% when measured at pH 7, has less than 250 ppm of P_2O_5 soluble in 1% citric acid, and is dominantly saturated with bivalent cations.

Monocotyledonous- of or pertaining to monocotyledon, any of a great subclass of seed plants (Angiospermae) bearing one cotyledon (seed leaf) in the embryo. Monocots include grasses, lilies, irises, palms and orchids.

Opal phytolith- dissolved silica absorbed by the root system of plants and precipitated into solid silica, or opal, with characteristic shapes.

Paleosol- a buried soil horizon; indicative of a prior period of surface stability and soil development.

Palynology- pollen analysis.

Panicoids- abb. of Panicoideae, a subfamily of grasses that thrive in warm temperatures and high available soil moisture.

Pedogenesis- initial soil formation

Ped surface- the exterior of a unit of soil structure such as an aggregate, crumb, prism, block or granule, formed by natural processes (in contrast with a clod, which is formed artificially).

Penecontemporaneous- almost at the same time.

Phase- an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or regiona and chronologically limited to a relatively brief interval of time (Willey and Phillips 1958:22).

Pleistocene- the geologic epoch that preceeded the Holocene which, together with it, forms the Quaternary era; a time of periodic glacial advance.

Polylobate- a phytolith with a lobe at both ends of a shaft and one or more lobes in between.

Pooids- abb. of Pooideae, a subfamily of grasses that thrive in cool temperatures and high available soil moisture.

Profile- A schematic drawing representing the stratigraphy of an excavation unit or backhoe trench.

Quaternary era- the last great subdivision of geological time, of which the Pleistocene is a part.

Reticulate- having a form or appearance of a network.

Seriation- ordering.

Silicified asteroscleriеds- silicified branched cells with heavy lignified secondary walls, usually non-living at maturity.

Site- any locus of human activity.

Spalls- a term used in Chism (1966) to denote the unused by-products of flintknapping (see debitage).

Spicules- one of a small, needle-like, calcareous growth supporting the soft tissues of certain invertebrates, such as sponges.

Stochastic- used in this case to denote change which is not determined by materialistic factors but is attributable to more indeterminable, random motives.

Stomata- (singular, stoma) minute openings bordered by guard cells in the epidermis of leaves and stems through which gases pass.

Stratigraphy- the spatial arrangement of soils and/or sediments with the younger deposits superimposed on the older.

Temper- the aplastic additive in the paste used in the manufacture of pottery that adds uniform drying and prevents cracking.

Tracheids- elongated, thick-walled conducting and supporting cells of xylem with tapering ends and pitted walls without true perforations. Found in nearly all vascular plants.

Tricomes- any surface appendage or epidermal outgrowth in a plant, comprising hairs, bristles, prickles, scales and root hairs.

Unit- the basic test pit excavated during the project, it measures $1m^2$.

Vacuole-tempered- a term used in Chism (1966) to describe pottery sherds characterized by the presence of cavities from which the tempering agent, such as shell or indurated clay, has been leached or otherwise eroded.

Wisconsinan- the last major glacial advance of the Pleistocene that occurred between about 90,000 and 10,000 years ago.